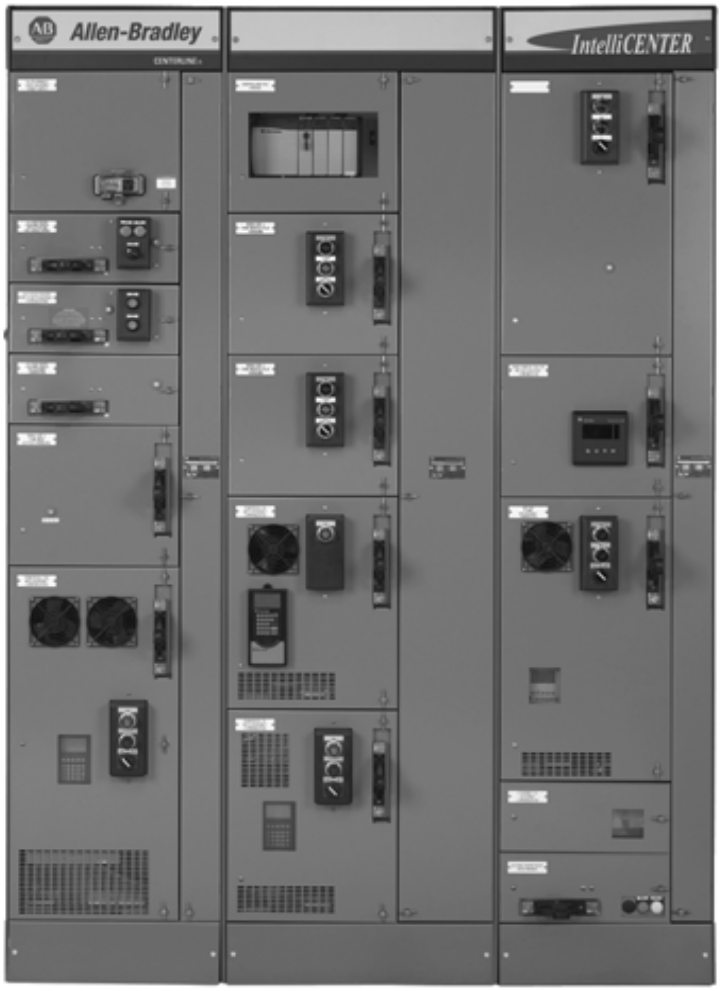
Program Guide

Allen-Bradley

CENTERLINE 2100 Motor Control Centers

Bulletin Number 2100



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About This Publication

The CENTERLINE® 2100 Motor Control Center Program Guide is intended to be a guideline for configuration. All configurations must be confirmed in PowerControl Builder.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
CENTERLINE 2100 Motor Control Centers Selection Guide, publication 2100-SG003	Provides general information about CENTELINE 2100 Motor Control Centers.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

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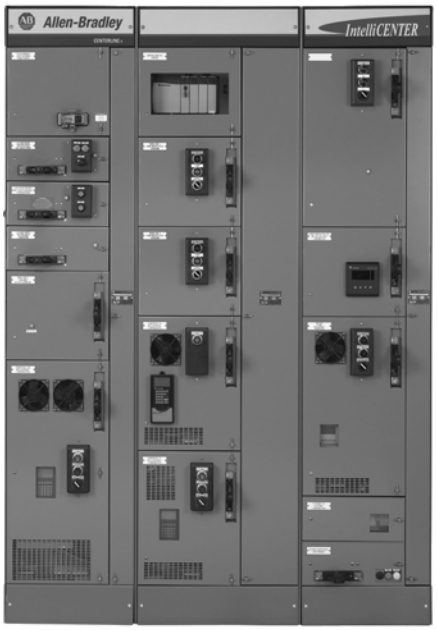
Chapter 1

General Information

CENTERLINE 2100 Motor Control Center



CENTERLINE 2100 Motor Control Center with IntelliCENTER Technology

What is New in this Publication

- Made the Program Guide available to customers.
- Updated the Documentation section.
- Updated with the current IntelliCENTER EtherNet/IP MCC offering with all flexible options.

Publication Overview

This is an internal commercial program guide for the configuration of CENTERLINE® 2100 Low Voltage Motor Control Centers (MCC)

Footnotes

IMPORTANT While using this publication, please read all footnotes throughout the publication. Footnotes contain necessary information about the configuration and limitations of sections, units and options being offered.

Other Resource Publications for CENTERLINE 2100 Motor Control Centers

Table 1 - Additional Resources

Publication	Title
2100-SR012	CENTERLINE 2100 MCC Specification Guide
2100-SR007	CENTERLINE 2100 MCC Specfication Guide, CSI Format
2100-SR003	CENTERLINE 2100 MCC Specification Checklist
2100-TD018	Mains and Incoming Lines Dimension
2100-IN012	CENTERLINE 2100 User Manual
2100-AT003	Power System Configuration Considerations for Selection of CENTERLINE 2100 MCCs
2100-SR008	DeviceNet Specification Guide
2100-TD019	CENTERLINE 2100 Motor Control Centers with DeviceNet Network
2100-TD031	CENTERLINE 2100 Motor Control Centers with EtherNet/IP Network
MCC-UM002	IntelliCENTER Software User Manual
MCC-RM001	IntelliCENTER EtherNet/IP Motor Control Centers Reference Manual

Contact your Allen-Bradley distributor, Rockwell Automation sales representative, or visit www.rockwellautomation.com/literature.

CENTERLINE 2100 MCC Applications

CENTERLINE 2100 MCCs are suitable for use on 3-phase, 3-wire or 4-wire, Wye connected power systems, rated 600 V or less, 50 or 60 Hz, which have a solidly grounded neutral. CENTERLINE 2100 MCCs can also be used on other power system configurations, however, some units and options may not be available. Refer to Appendix page 367 for additional information.

Service and Storage Conditions

CENTERLINE 2100 MCCs conform to NEMA standard ICS 1-1993 for service and storage conditions. All MCCs should have an ambient operating temperature above 0°C but shall not exceed 40°C with up to 95% non-condensing humidity. If the equipment is stored, the ambient temperature shall be above -30°C but shall not exceed 65°C. In addition, MCCs have an altitude class of 2 km. The altitude class of 2 km designates equipment for installation where the altitude does not exceed 2000 meters (6600 feet). For installation above 2000 meters, contact your Allen-Bradley distributor or Rockwell Automation sales representative for derating requirements.

IMPORTANT MCCs containing variable frequency drives units have an altitude class of 1 km. For installation above 1000 meters, contact your local Allen-Bradley distributor or Rockwell Automation sales representative for derating requirements.

UL/C-UL/CSA Marking

CENTERLINE 2100 MCCs are listed by Underwriters Laboratories, Inc. (file number E49289) as complying with Standard Safety UL 845 (UL) and either listed by Underwriters Laboratories, Inc. or certified by Canadian Standards Association (CSA) as complying with standard C22-2, No. 254-05 (C-UL or CSA). CENTERLINE 2100 MCCs also meet the requirements in Mexican standard for MCCs, NMXJ-353-ANCE-2010. The MCC product, sections, and units, therefore, carry the respective marking unless otherwise indicated in the footnotes on the various pages in this publication.

ISO 9001 Certification

The facilities that manufacture CENTERLINE 2100 MCCs are located in Richland Center, Wisconsin, Monterrey, Mexico, and Tecate, Mexico. All facilities have been certified to be in conformance to the requirements of Quality Management System ISO 9001. These facilities presently are certified by Det Norske Veritas to ISO 9001: 2000, certificate number CERT-9379-2004-AQ-HOU ANAB, effective May 30, 2007.

CE Marking

The European Union (EU) has established a program whereby products are tested and qualified to meet its harmonized standards and to fulfill the EN Directives. Upon completion of this testing and qualification, special documentation is required so the products may bear CE marking. Included with this program is the requirement for special instruction literature, product labeling, quality programs, and special design requirements. Generally, the CENTERLINE 2100 MCC product can fulfill these requirements, but due to the customization that is required, the CE marking of the product is available only on the Engineered delivery program. In case of variable frequency drives (as well as other solid-state devices), the EU deemed it necessary to add an EMC directive (2004/108/EC). This directive requires more stringent RF emission and immunity standards than normal. To meet these requirements and carry the CE mark, the CENTERLINE 2100 drive packages can be adapted with EMC tested RFI filters and additional shielding hardware. These special packages may require larger MCC enclosures.

IMPORTANT The CE requirement is for the European Union/Community and is not a mandate for other parts of the world.
For more information, visit http://www.ab.com/certification/#cemark.

IEC 61439

The CENTERLINE 2100 structures and many units fulfill IEC 61439 type tested assembly (TTA) and unit requirements. Should custom designs and modifications be required, these can be qualified to IEC 61439 as partially pre-tested assembly (PTTA) and unit requirements.

American Bureau of Shipping (ABS)

CENTERLINE 2100 MCCs have fulfilled the requirements and are approved by the American Bureau of Shipping (certificate 99-SB55875-X). CENTERLINE 2100 MCCs do meet ABS shipping requirements, but due to required customization, ABS maritime shipping is available only on the Engineered program.

NEMA Defined

NEMA—National Electrical Manufacturers Association.

NEMA Class

The following is a description of Class I, as paraphrased from NEMA standard ICS 18-2001: Class I motor control centers shall consist of mechanical groupings of combination motor control units, feeder tap units, other units, and electrical devices arranged in a convenient assembly. They include connections from the common horizontal power bus to the units. They do not include interwiring or interlocking between units or to remotely mounted devices, nor do they include control system engineering. Only diagrams of the individual units are supplied.

NEMA Class II interwiring offers the addition of interlocking and wiring between units as specifically described in overall control system diagrams supplied by the purchaser. Contact your Allen-Bradley distributor or Rockwell Automation sales representative for pricing and availability.

NEMA Type

Class I motor control centers can be provided in NEMA Type A or B construction:

- Type A—User's power and control connections are made directly to the device within the unit.
- Type B—Terminal blocks are supplied for user's control termination within unit insert. On NEMA size 1…3 starter units and 30…100 A contactors units, terminal blocks are also supplied for user's load terminations (NEMA Type BT). NEMA Space Saving units do not include power terminal blocks (NEMA Type BD).

NEMA/IEC Enclosure Comparison

The following table is a comparison of Allen-Bradley CENTERLINE 2100 MCC NEMA enclosure type numbers to IEC Standard 60529, Classification of Degrees of Protection Provided by Enclosures. The comparison is based on data from tests conducted on the CENTERLINE 2100 MCC enclosures and the NEMA enclosure type test requirements, which meet or exceed the IEC enclosure classification designation test requirements.

Table 2 - Degree of Protection Comparison

NEMA Type	IEC Type
NEMA Type 1 vented (with or without gasketed doors)	IP20
NEMA Type 1 vented with filters (with or without gasketed doors)	IP30
NEMA Type 1 non-vented (without gasketed doors)	IP40
NEMA Type 1 with drip hood = NEMA Type 2 (with or without gasketed doors)	IP41
NEMA Type 3R	IP44
NEMA Type 12 without bottom plates	IP53
NEMA Type 12 with bottom plates	IP54
NEMA Type 4	IP65

NEMA Enclosure Type Descriptions

- NEMA Type 1:

  Type 1 units and sections are intended for indoor use, primarily to provide a degree of protection against contact with the enclosed equipment in locations where unusual service conditions do not exist. The enclosures are designed to meet the rod entry and rust resistance design tests. The enclosure is sheet steel, treated to resist corrosion.
- NEMA Type 1 with gasketed doors (sometimes referred to as 1G):

  Type 1 with gasketed unit doors are completely gasketed around the perimeter of the unit doors. All gasketing is closed cell neoprene.
- NEMA Type 3R:

  Non-walk-in front mounted only. Door-within-a-door construction. Type 3R units and sections are intended for outdoor use, primarily to provide a degree of protection against falling rain and to avoid damage from the formation of ice on the enclosure. They are designed to meet rod entry, rain, external icing and rust resistance design tests. They are not intended to provide protection against conditions such as dust, internal condensation or internal icing.
- NEMA Type 4:

  Non-walk-in front mounted only. Door-within-a-door construction. Type 4 units and sections are designed for indoor and outdoor use, primarily to provide protection against windblown dust and rain, splashing water, and hose-directed water. They are also designed to remain undamaged by the formation of ice on the enclosure. They are designed to meet hosedown, external icing, and rod entry design tests. The enclosures are not designed to protect against internal condensation or internal icing.
- NEMA Type 12:

  Type 12 enclosures are intended for indoor use, primarily to provide a degree of protection against dust, falling dirt and non-corrosive dripping liquids. They are designed to meet drip, dust, and rust resistance tests. They are not intended to provide protection against conditions such as internal condensation.
  - This publication refers to standard NEMA Type 12 design (standard sheet steel). For stainless steel NEMA Type 12 enclosures, contact your Allen-Bradley distributor or Rockwell Automation sales representative.

Delivery Programs

CENTERLINE 2100 MCC products are available on several quick delivery programs and limited to equipment described in this publication.

- SC and PE:

  Products indicating SC or PE delivery provide SC-I and PE-I delivery. When options are added or specified for a section, time of delivery is determined by the longest lead time.

  – SC-I:

    This program offers stock-supported, individual plug-in units. This program applies to all plug-in units unless they are labeled SC-II. The SC-I program provides the quickest delivery.

  – SC-II:

    This program offers stock-supported vertical sections, with factory-installed units for a completely assembled MCC. Units specifically labeled SC-II must be factory installed and are not for plug-in installation in the field.

  – PE-I and PE-II:

    Shading indicates equipment that is offered on the PE-I or PE-II program. These programs offer a broad range of pre-engineered units and sections and a slightly longer lead time than our SC programs. While PE-I units are available for plug-in installation in the field, units specifically labeled PE-II must be factory installed.

- Engineered:

  Equipment or modifications not available on the above delivery programs may be available on the Engineered program. This program offers the complete line of assembled motor control equipment, custom wired for the customer's needs. Additionally, a wide range of special control and bus options are offered, making this our most versatile delivery program. Contact your Allen-Bradley distributor or Rockwell Automation sales representative for more information.

Delivery Time is based on the equipment with the longest lead time. Quicker delivery is possible when equipment is separated and ordered according to the delivery category. For example, if an order has one engineered plug-in unit and the remaining units and sections are SC-II - order the engineered unit as a separate item. The SC-II units and sections ship on the SC-II delivery program and only the engineered unit has a longer delivery time.

Delivery Program Indications

Delivery programs are indicated in the right column of the tables. ENG delivery program is indicated by shaded cells.

Table 3 - Delivery Program

Catalog Number Wiring Type B—Class 1 NEMA Type 1 and Type 1 w/ gasket	Delivery Program
2112B-FA_-___	SC
2112BB-GA_-___	PE-II

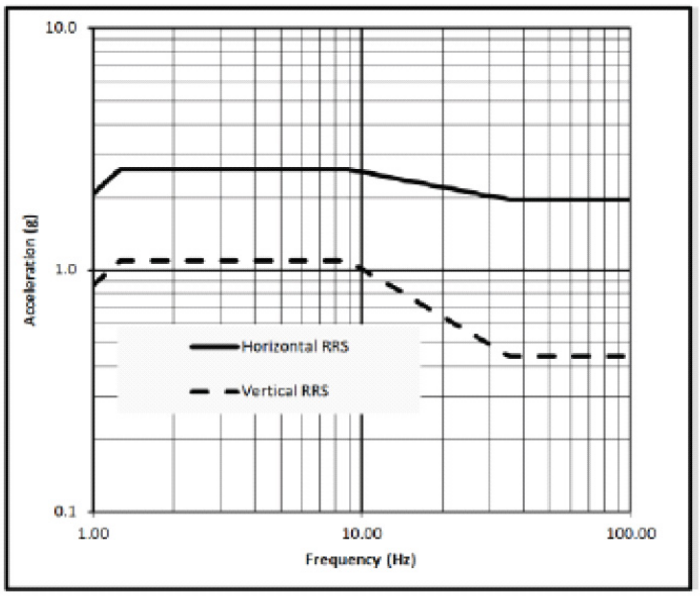
Discount Schedule

The CENTERLINE 2100 MCCs are on Discount Schedule A6.

Seismic Applications

Actual CENTERLINE 2100 MCC units have been seismically qualified by dynamic (triaxial multi-frequency testing) seismic tests using ICC–ES AC156 acceptance criterion that covers general equipment and supports the seismic certification of electrical systems such as MCCs. The testing was carried out in accordance with ICC–ES AC156 criteria and supports data for the following qualification requirements:

Compliance Documents	Compliance Level
2010 American Society of Civil Engineers (ASCE) 7-10 **2012 and 2015 International Building Code (IBC)** **2013 California Building Code (CBC)** **2012 ICC-ES AC156**	**S_{DS} = 1.63 g**



AC156 S_{DS} 1.63 g Required Response Spectra (RRS)

Throughout the seismic testing, the MCC units were under power and operated before, during, and after the seismic tests.

To obtain an IBC or UBC seismic withstandability, each individual CENTERLINE 2100 MCC line-up (including those in double front applications) must be mounted on an adequate seismic foundation. Installation must be carried out per the anchoring requirements as indicated in this instruction manual. All columns in the MCC line-up must also be bolted together per instructions in CENTERLINE 2100 Motor Control Centers Joining and Splicing Vertical Sections, publication 2100-IN010.

In the CENTERLINE 2100 MCC line-up, mounting channels are incorporated in the standard design. As an alternative to bolt down anchoring, these mounting channels may be welded to an adequate seismic foundation. For seismic weld down applications, see Seismic Requirements in publication 2100-IN012.

Intelligent Motor Control Products

Throughout this publication, you can find units and options that are network ready to use in CENTERLINE 2100 MCCs with IntelliCENTER® technology. The components used in these units are network compatible and ODVA certified. Also, the installation conforms to the rules and guidelines set by ODVA.

IntelliCENTER technology includes items such as, a power supply unit, built-in network cabling system, and unit cables. IntelliCENTER technology is UL and C-UL listed and meets the requirements of a Class 1 power limited circuit (in Canada, Class 1 extra-low-voltage power circuit). Per NEC, this circuit is supplied from a source that has a rated output of not more than 30V and 1000 VA. The power supply unit has an 8 A, 24V output. The network cabling is rated 8 A, 600V.

See NEC Article 725 for more detailed information.

Type 2 Protection

Short circuit coordination is defined in IEC 60947-4-1.

Type 2 protection (also referred to as Type 2 coordination) is obtainable when the fuses are specified and sized accordingly. Only Type 1 coordination is available, other than on specified fuses and circuit breaker units.

Standard Efficiency, High Efficiency, and Special Motor Applications

Rockwell Automation makes engineering evaluations for the protective device (circuit breaker or fuse) selection, sizing, and setting range based on the protection rules, requirements, and motor criteria as stipulated in NEC, NEMA, and UL standards (for example, motor full load currents [FLCs], X/R ratios, lock rotor currents, and nominal utilization voltages). Should the motor application have criteria that deviate from those stated in the aforementioned standards, higher FLC and/or motor inrush currents (greater than 1300% of the nominal FLC) may be experienced (for example, special motors, non-standard NEMA motors, energy efficient motors, Design E motors, and IEC Type N motors).

To address these cases, consult publication 2100-TD032 (for circuit breaker applications), publication 2100-TD003 (for power fuse applications), and the NEC for selection guidance. For further assistance or information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Documentation

Rockwell Automation offers various low voltage motor control center documentation packages to meet diverse requirements. This documentation is available in different formats: electronic (through email), CD, and paper. The documentation serves different needs: product approval, drawings for information, final drawings, and service manuals.

The electrical diagrams, equipment list, and other supporting documentation are also included in hard copy with the MCC for installation. The equipment list includes the motor control center layouts, nameplate data, floor plans, and splicing data. Major components, such as drives and SMCs, installed in the MCC have hard copy publications shipped in the motor control center.

For assembled motor control centers, the following documentation is supplied:

- Motor control center layout (elevation) and specification (one-line diagrams and schematics)
- NEMA CENTERLINE 2100 Low Voltage Motor Control Center Units and Sections Product Information, publication 2100-PC001
- Receiving, Handling, and Storing Motor Control Centers, publication 2100-IN040

  This document is attached to the outside packaging of each shipping split.
- Unit wiring diagram and installation instructions for individual units

  Field termination and torquing requirements for units are included on the unit wiring diagrams. This documentation is located in a centralized wiring diagram holder or other location depending on configuration.

Manuals and quick start guides for products such as SMC units, AC drive units, and PLC units can be found online at http://www.rockwellautomation.com/literature.

Documentation Packages

The following table describes the optional documentation packages available for low voltage motor control centers. Additional custom documentation packages can be created to meet most requirements.

Documentation delivered electronically (email or CD) comes as a single PDF document that is organized and bookmarked for ease-of-use. This format is provided regardless of the documentation type.

Documentation is supplied on a per order basis.

Order and Documentation Cycle

This chart indicates typical documentation available upon request. The different documents serve various purposes and are available at different points in the order cycle. The order cycle follows these steps:

Figure 1 - Order and Documentation Cycle

Table 4 - Documentation Available

Package	Order Cycle Step	Documentation Included								Media	Catalog Number
		Elevation Drawings	One Lines	Schematics	Component Data Sheets	Recommended Spare Parts List (4)	Startup Documentation	Manuals	Quality Certificate		
No-Charge Email	Any	✓	✓	✓	(3)	(3)	(3)	(3)	(3)	Email	(5)
Standard Approval Documentation (1), (2)	Step 2	✓	✓	✓						CD	2100-APP-CD
										Paper	2100-APP-P-3
Full Submittal Documentation for Approval (1), (2)	Step 2	✓	✓	✓	✓	✓	✓	✓		CD	2100-SUB-CD
										Paper	2100-SUB-P-3
As Built/Final (1)	Step 4	✓	✓	✓						CD	2100-FIN-CD
										Paper	2100-FIN-P-3
Standard Service Manuals / Operation and Maintenance (1)	Step 4	✓	✓	✓	✓	✓	✓	✓	✓	CD	2100-OM-CD
										Paper	2100-OM-P-3

(1) Item is quantity one. If more are required, change the quantity of the line item in the quote / order.
(2) Includes the cost of two submittal cycles; the intial submittal and one followup re-submittal.
(3) Not included as standard, but can be added by special request at no charge.
(4) Not priced or linked.
(5) Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

IMPORTANT As Builts/Final Drawings are included in Standard Service Manuals/Operation and Maintenance Manuals.

CENTERLINE 2100 MCCs Support

Email: RAMCCSupport@ra.rockwell.com

Phone: 1-440-646-3434

Select Option 3, then enter code 901 for CENTERLINE 2100 MCC support.

CENTERLINE 2100 MCCs with IntelliCENTER Technology Support

Email: RAICTechSupport@ra.rockwell.com

Phone: 1-440-646-3434

Select Option 3, then enter code 903 IntelliCENTER Technology support.

General Terms and Conditions of Sale

A copy of the general terms and conditions of sale for CENTERLINE 2100 Motor Control Centers can be obtained at

http://www.rockwellautomation.com/rockwellautomation/legal-notices/terms-of-sale.page?.

Serial Number and Series Letter Information

- From 1980 to 1996, only numbers 600000 to 999999 were used.
- Refer to Series Identification for Sections for the implementation date of series letters on sections and units.
- The serial numbers of sections are on the serial plate on the wireway door, for special width sections, the nameplate is located on the section door. On special width sections, the nameplate is located on the section door.
- The serial numbers of units are on the nameplate on the bottom of the units.
- SC-I sections or units will have a series letter after the unit or section catalog number.
- In late 1995, some SC, SC-II and PE orders were entered on PASSPORT.

Table 5 - Serial Number and Series Letter

Year	CENTERLINE 2100						Bulletin 2400 Series Units[4]
	Factory Order No.		Serial Numbers		Series		
	Start	End	Start	End	Section	Unit	
1971	704403	807499	959060	971209	A	A	None
1972	807500	121409	971210	983266	A	A	None
1973	121500	346999	983267	996532	A	A	None
1974	347000	539999	996535	999946	A	A	None
			A128502	A483339			
1975	540000	719199	A483344	B677442	A	A	None
1976	719200	933199	B677452	C933199	A-B	A-B	None
1977	933200	268699	D933200	D268699	B	B	None
1978	268700	526199	E268700	E526199	B	B	None
1979	526200	748699	F526200	F748699	B-C	B-C	None
1980	748700	898049	G748700	G898049	C	C	None
1981	898050	661299	H898050	H661299	C-D	C-D-E	None
1982	661300	804249	J661300 [3]	J804249 [3]	D-E	D-E-F-G	None
1983	804250	948440	K804250	K948440	E-F	F-G	None
1984	948441	693587	L948441	L693587	F	F-G-H-J	None
1985	693588	849069	M693588	M849069	G	H-J	None
1986	849070	612263	N849070	N612263	G-H-J	H-J-K	None
1987	612264	791331	P612264 [3]	P791331 [3]	J	K	None
1988	791332	991197	R791332 [3]	R991197 [3]	J	K	None
1989	991198	834534	T991198 [3]	T834534 [3]	J	K	None
1990	834535	704948	W834535 [3]	W704948 [3]	J-K	K-M	None
1991	704949	995816	X704949	X995816	K	M	A
1992	995817	732348	Y995817	Y732348	K	M	A-B-C
1993	732349	773410	Z932349	Z773410	K	N	A-C
1994	773411	795559	A773411	A795559	K	N-P	A-C
1995	795560	818971	B795560	B818971	K	N-P	A-C
1996	818972	824311	C818972	C824311	K-L	P-Q	A-C
	NPR624	QBH320	CNPR624	CQBH320			D

Table 5 - Serial Number and Series Letter

Year	CENTERLINE 2100						Bulletin 2400 Series Units[4]
	Factory Order No.		Serial Numbers		Series		
	Start	End	Start	End	Section	Unit	
1997	824312	N/A	D824312	N/A	L	Q	D
	QBH321	RPH250	DQBH321	DRPH250			
1998	RPH251	TDQ341	ERPH251	ETDQ341	L	R	D
1999	TDQ342	VZM602	FTDQ342	FVZM602	L	R	D
2000	VZM603	XWY931	GVZM603	GXWY931	L	T	D
2001	XWY932	BDPW81	HXWY932	HBDPW81	M	U	D
2002	BDPW82	CBJD56	JBDPW82	JCBJD56	M	U-V	D
2003	CBJD57	CYMV52	KCBJD57	KCYMV52	M	U-V	D
2004	CYNR34	DXSK68	LCYNR34	LDXSK68	M	U-V	D
2005	DXSK69	FYFW68	MDXSK69	MFYFW68	M	X	D
2006	FYFW69	GYTT25	NFYFW69	NGYTT25	M	X-Y	D
2007	GYTT26	JDKT40	PGYTT26	PJDKT40	M	X-Y	D
2008	JDKT41	KFMV97	RJDKT41	RKFMV97	M	X-Y	D
2009…Present[1]	[2]						

(1) Change in Factory Order Number and Serial Number.

(2) For sections and units, Series must be determined from the nameplate.

(3) Prefix letters I, O, Q, S, U, and V are not used.

(4) Bulletin 2400 series units were discontinued.

Series Identification for Sections

Table 6 gives a brief explanation of the series letter changes that have taken place since the original design of the CENTERLINE 2100 Motor Control Center.

Table 6 -

Sections			
Series Letter	**Scope**	**Description of Change**	**Date Implemented in U.S.**
A (1)	—	Original design	February 1971
B (1)	All	Changed terminal blocks	November 1976
C (1)	All	Elimination of external mounting channels	June 1979
D (1)	All	Reverse fed 2192 and 2193	April 1981
E (1)	All	Redesign gasketing	October 1982
F (1)	All	Modified top horizontal wireway pan to accept units with handle interlock in topmost space factor	October 1983
G (1)	42K	42K bracing—incorporates new bus support and cover	January 1985
G (1)	65K	65K bracing—incorporates new bus support and cover	July 1985
H(1)	All	New hinge design	January 1986
J(1)	All	Changed handle, operating mechanism and circuit breaker to Cutler-Hammer Series C, 150 A, 250 A and 400 A frame	October 1986
K(1)	All	Changed to new unit grounding system	May 1990
L	All	Changed to new 600…1200 A circuit breaker operating mechanism	May 1996
M	All	Changed to serpentine DeviceNet cabling system	May 2001
N	All	New design for 100,000 A bus bracing and begin use of Right-hand side sheet with integral mounting flanges	May 2009
P	All	SecureConnect units	September 2011

(1) Replacement and renewal parts are no longer supported. Consult MCC Technical Support.

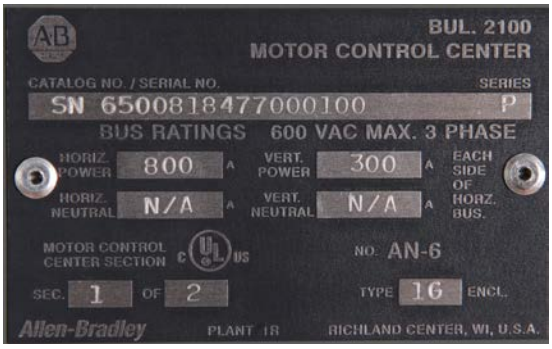
Complete new series units with comparable features and options can be retrofitted into any series of structures as shown in the table on page 27.

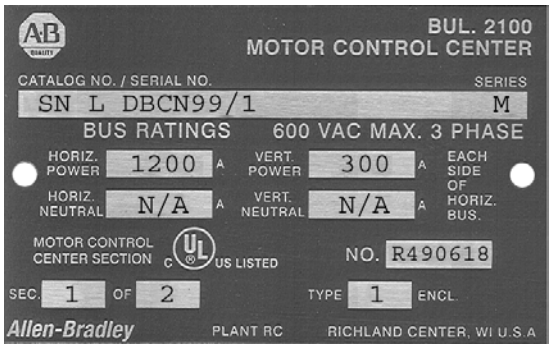
Section Nameplate Data

When communicating with Rockwell Automation about a particular Allen-Bradley motor control center, the catalog number or serial number and series letter are required to properly identify the equipment. Refer to the CENTERLINE Motor Control Centers User Manual, publication 2100-IN012, for more information.

Each vertical section has a nameplate located on the vertical wireway door. On special width sections, the nameplate is located on the section door. Information on the section nameplate includes:)

- Catalog number (serial number)
- Series letter of the section
- Maximum bus bar voltage and current rating
- Section location number





Unit Label Data

When communicating with Rockwell Automation about a particular Allen-Bradley motor control center, the catalog number or serial number and series letter are required to properly identify the equipment. Refer to the CENTERLINE Motor Control Centers User Manual, publication 2100-IN012, for more information.

Each unit has a unit label located inside the unit on the bottom plate. Information on the unit nameplate includes:

- Serial number
- Series letter
- Factory order number
- Catalog string number
- Unit location
- System voltage

Unit Label Data for units shipped on the SC or PE Delivery Programs

CAT: SERIAL NO: DESCRIPTION: RATING: PLANT: MANUFACTURED ON: ***Allen-Bradley*** **PRODUCT OF:**	WIRING DIAGRAM, # _____ ELEMENT LIST, # _____ IF CENTRALIZED DRAWINGS REQUESTED, DRAWINGS ARE LOCATED BEHIND THE MARKED HORIZONTAL WIREWAY COVER.

TIP CAT number for units supplied on the Engineered Delivery Program will have a unique catalog number based on the factory order number. For example, YULDBCN99/1AF (assembled MCCs) or 2100U-LDBCN99/1 (individually ordered units).

Series Identification for Units

This table gives a brief explanation of the series letter changes that have taken place since the original design of the CENTERLINE 2100 Motor Control Center.

Table 7 - Unit Series

Units			
Series Letter	**Scope**	**Description of Change**	**Date Implemented in U.S.**
A (1)	—	Original design	February 1971
B (1)	All sizes	Changed terminal blocks	November 1976
C (1)	All sizes	Changed handle mechanism to Cutler-Hammer MCPs	June 1979
D (1)	Size 5	Changed from ITE to Allen-Bradley 400 A disconnect	April 1981
E (1)	All sizes	Changed from Bulletin 709 series K starters to Bulletin 500 line starters	April 1981
F (1)	All sizes	Redesign of gasketing, wraparound, and unit support pan for Bulletin 700 line	October 1982
G (1)	All sizes	Redesign of gasketing, wraparound, and unit support pan for Bulletin 500 line	October 1982
H (1)	All sizes	Changed to new door, CB mechanism and control station	April 1984
J (1)	Size 5	Changed to Bulletin 500 series L	October 1984
	Size 3	Changed to new PCP 100 A disconnect	December 1988
	Size 6	Changed to Bulletin 500 series B starters	October 1988
K(1)	Size 1…5 CB units and size 1…2 disc units	Changed handle, operating mechanism and circuit breaker to Cutler-Hammer Series C, 150A, 250A and 400A frame	October 1986
L(1)	21A through 54A	Changed to Bulletin 100 line contactors in 21A, 30A and 45A SMC units and original design 24A, 35A and 54A SMC units	November 1989
M(1)	All sizes	Changed to new unit grounding system and 600 A, 800 A, and 1200 A bolted pressure switch	May 1990
N(1)	All sizes	Changed to PCP 200 A and 400 A disconnect, rerated vacuum Bulletin 2112 and 2113 and new pilot device offerings	January 1993
P(1)	0.5 SF CB units 2103L, 2113, 2193	External auxiliary on circuit breakers	April 1994
Q	All sizes and ratings	New disconnect external auxiliary contacts and new 600…1200 A circuit breaker operating mechanism	May 1996
R	SMC units	Redesign and upgrade of ratings for 24…500 A SMC-2 and SMC-PLUS units. Original design of SMC Dialog Plus units.	August 1997
	1200 A 2193	Redesign of 1200 A, 2193F and 2193M units	November 1997
	800 A 2193	Changed circuit breakers to MDL Frame	November 1998
	225 A 2193F	Changed circuit breakers from J Frame to F Frame	October 1999
T	2000 A 2193	Changed to Flange Mounted Operating Handle	November 2000
	All sizes	Changed the Bulletin 800MR and Bulletin 800T-PS pilot devices to Bulletin 800Es	
	All 1.5 space factor units	Changed unit bottom plate	
U	All except 2100-SD1	Changed to new Bulletin 1497 control circuit transformer	July 2001
	2100-SD1	Changed smoke detector head and base components	November 2001

Table 7 - Unit Series

Units			
Series Letter	**Scope**	**Description of Change**	**Date Implemented in U.S.**
V	2162Q, 2163Q, 2164Q, 2165Q	Redesign of 240…480V PowerFlex 70 and release of 600V PowerFlex 70	April 2002
	2162R, 2163R, 2164R, 2165R	Original release of PowerFlex 700	Beginning July 2002
	2154H, 2155H	Original release of SMC-3	Beginning November 2002
	2154J, 2155J	Original release of SMC Flex	Beginning April 2004
	2112, sizes 3, 4 and 5	Redesign to reduced space factor with Class J fuse clip	April 2004
	2162T, 2163T	Original release of PowerFlex 40	September 2004
	2107, 2113, size 3	Reduced space factor	April 2005
X	2162Q, 2163Q	Reduced space factor, changed CCT with integral fuses	April 2005
	All sizes	800F Pilot Devices	August 2005
Y	2154J, 2155J, 108 A and 135 A	Redesign to change units from frame mounted to plug-in design	March 2006
	2100-SP	Redesign to change from control concepts	
		IslaGuard to Allen-Bradley Bulletin 4983-DS with 80 KA surge rating	
	2164Q, 2164R, 2165Q, 2165R (Drive with manual bypass)	Redesign for change from SMP overload relay to E1 Plus	August 2006
	2107, 2113, NEMA Space Saving Size 2 & 3 units	Redesign due to starter component series letter change	December 2009
	2162U, 2163U	Original release of PowerFlex 753 drives	February 2011
	2162V, 2163V	Original release of PowerFlex 755 drives	August 2013
Z	2103L	Redesign of units for use with Bulletin 140G circuit breakers	February 2014
	2107, 2113, 2123, 2127	Redesign of units for use with Bulletin 140G and 140MG circuit breakers	
	2155H, 2155J	Redesign of units for use with Bulletin 140G circuit breakers	
	2163Q, 2163R, 2163T, 2163U, 2163V	Redesign of units for use with Bulletin 140G circuit breakers	
	2183	Redesign of units for use with Bulletin 140G circuit breakers	
	2193F, 2193M	Redesign of units for use with Bulletin 140G circuit breakers	
	2162W, 2163W	Original release of PowerFlex 525 drives	September 2014
	2162X, 2163X	Original release of PowerFlex 523 drives	
	All starters	Original release of E300 overload relay	

(1) Replacement and renewal parts are no longer supported. Consult MCC Technical Support.

Complete new series units with comparable features and options can be retrofitted for any series of structures as shown in the table on page 27.

Series Lettering—Units and Sections

When using sections in conjunction with units of different series letters, consult the MCC Modifications for Unit and Structure Compatibility table below.

In 1982, modifications were made to improve the integrity of the gasketing between the unit door and structure of NEMA Type 1 with gasket and Type 12 sections. This has been accomplished by gasketing the structure instead of the unit door. The change applies to all CENTERLINE 2100 units with series letter F and later and all sections series letter E and later. Also, when series H and later units are installed in a series A through E section in the topmost unit location, a new top horizontal wireway pan is required.

Table 8 - MCC Modifications for Unit and Structure Compatibility

If Mounted in this Type of Section (1),(2)	Plug-In Units		No Additional Parts Required	Requires Style 1 Unit Support Pan	Requires Style 3 Unit Support Pan	Requires Style 3 Unit Support Pan w/ Bushing	Requires Alternate Top Horizontal Wireway Pan	Requires Door Gasketing Kit	Requires Retrofit Kit (7)	Requires Ground Bus Kit (8)
	Space Factor	Series	—	2100H-UAJ1 See page 329	2100H-UA1 2100H-UJ1 See page 329	2100H-USPA1 2100H-USPJ1 See page 329	2100H-NA4A1 2100H-NA4J1 2100H-NA4A2 2100H-NA4J2 See page 323	2100-GJ10 See page 324	2100H-R1 2100H-R2 See page 330	2100H-GS1 See page 325
NEMA Type 1 Series A-D (3)	1.0 or larger	A-E (3)	✓	—	—	—	—	—	—	—
		F-L (3)	—	✓	—	—	✓ (6)	—	—	—
		M or later (5)	—	✓	—	—	✓ (6)	—	—	✓
NEMA Type 1 Series E-J (3), (4)	0.5 (2)	N or later	—	—	—	✓	—	—	✓	(8)
	1.0 or larger	A-E (3)	—	—	✓	—	—	—	—	
		F-L (3)	✓	—	—	—	—	—	—	—
		M or later (5)	—	—	—	—	—	—	—	✓
NEMA Type 1 Series K or later	0.5 (2)	N or later	✓	—	—	—	—	—	—	—
	1.0 or larger	A-L (3)	—	—	✓	—	—	—	—	(8)
		M or later	✓	—	—	—	—	—	—	—
NEMA Type 1 w/ gasket or Type 12 Series A-D	1.0 or larger	A-E (3)	✓	—	—	—	—	—	—	—
		F-L (3)	—	✓	—	—	✓ (6)	✓	—	—
		M or later	—	✓	—	—	✓ (6)	✓	—	✓
NEMA Type 1 w/ gasket or Type 12 Series E-J (4)	0.5 (2)	N or later	—	—	—	✓	—	—	✓	✓
	1.0 or larger	A-E (3)	—	—	✓	—	—	—	—	(8)
		F-L (3)	✓	—	—	—	—	—	—	—
		M or later	—	—	—	—	—	—	—	✓
NEMA Type 1 w/ gasket or Type 12 Series K or later	0.5 (2)	N or later	✓	—	—	—	—	—	—	
	1.0 or larger	A-L (3)	—	—	✓	—	—	—	—	(8)
		M or later	✓	—	—	—	—	—	—	—

(1) When installing unit in topmost location in vertical section, care must be taken to comply with the National Electrical Code 6′ 7″ (2.0 m) unit handle-to-floor height limitation. A unit operating handle extender (2100H-NE1) is available which provides 3″ (76.2 mm) added height flexibility. See page 324 for catalog number.

(2) When CENTERLINE 2100, 0.5 space factor or Space Saving NEMA Starter plug-in units are ordered unassembled or ordered for existing sections, a centralized wiring diagram holder kit (2100H-WDH) should be ordered. See page 325.

(3) Replacement and renewal parts are no longer supported. Consult MCC Technical Support.

(4) Series E-J sections cannot accommodate 0.5 space factor or Space Saving NEMA Starter plug-in units in bottom-most unit location.

Footnotes continue on the next page.

(5) Consult MCC Technical Support for assistance with possible door hinge requirements.
(6) Required only if series F or later 1.0 space factor or larger CENTERLINE 2100 unit is installed in topmost location of series A through E vertical sections.
(7) Permits installation of 0.5 space factor or Space Saving NEMA Starter plug-in units in existing series E through J CENTERLINE 2100 vertical sections. Refer to page 330 for information.
(8) A ground strap can be used to ground units rather than installing a ground bus. See publication 2100-IN014.

Circuit Breaker Suffix Letter Designation

Table 9 -

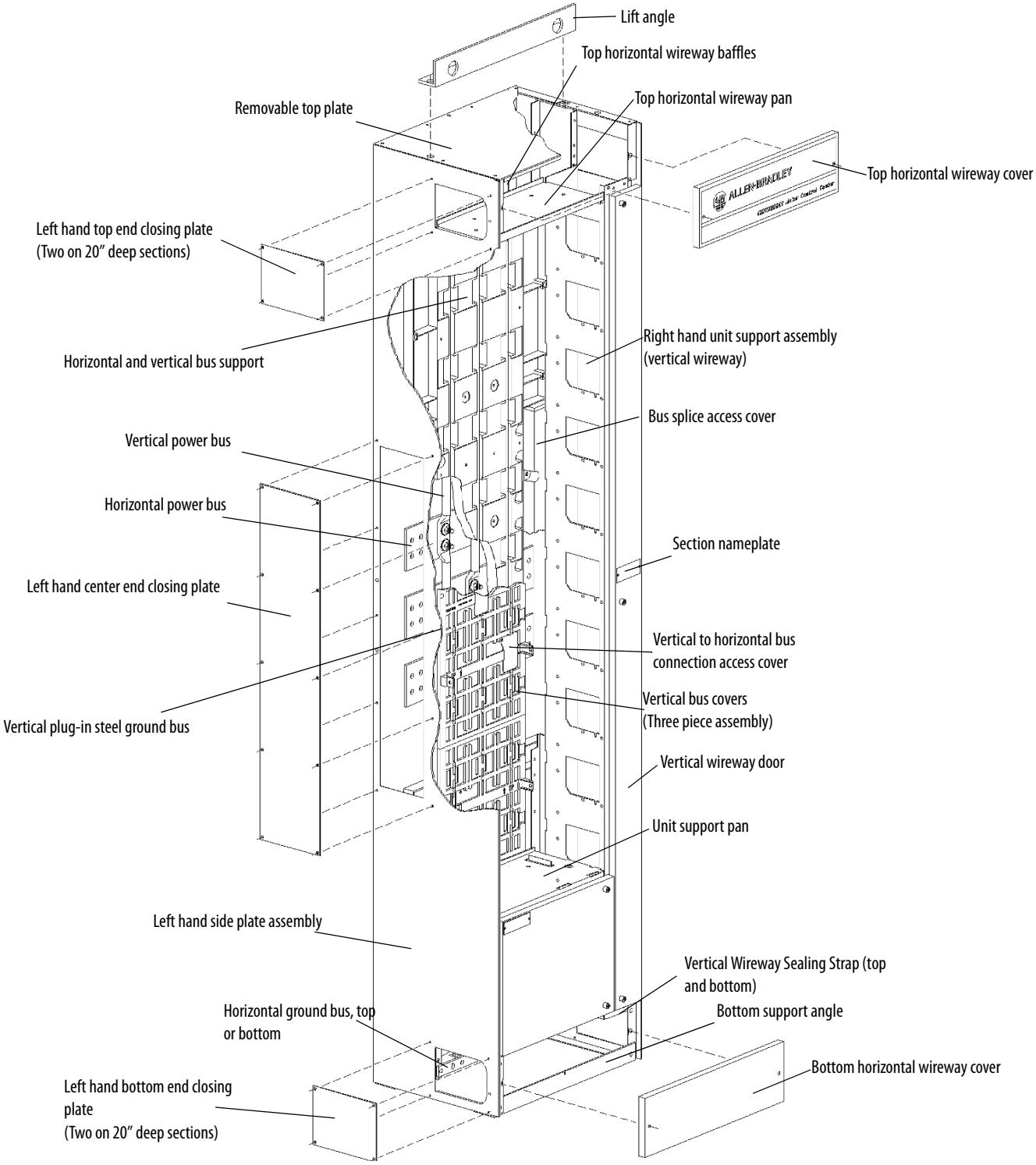
Type of Circuit Breaker	Trip Type	Catalog Number Designation		Circuit Breaker Frame Type						
		Old	New	125 A	125 A	250 A	400 A(1)	800 A(1)	1200 A(1)	3000 A(1)
High I.C. Instantaneous Trip Only	MCP	CA	T_A	TGA	THA	TJA	TKA	TMA	—	—
High I.C. Instantaneous Trip with Current Limiter	MCP	CC	—	—	—	—	—	—	—	—
Standard I.C. Inverse Time	Thermal Magnetic or Electronic	CT	—	—	—	—	—	—	—	—
Medium I.C. Inverse Time	Thermal Magnetic or Electronic	CB	—	—	—	—	—	—	—	—
High I.C. Inverse Time	Thermal Magnetic	CM	—	TGM	THM	TJM	—	—	—	—
High I.C. Inverse Time	Electronic	CM	T_M	—	—	—	TKM	TMM	TNM	—
Inverse Time with Current Limiter	Thermal Magnetic	CD	—	—	—	—	—	—	—	—
Extra High I.C. Inverse Time	Thermal Magnetic	CX	—	—	THX	TJX	—	—	—	—
Extra High I.C. Inverse Time	Electronic	CX	T_X	—	—	—	TKX	TMX	TNX	
Ultra High I.C. Inverse Time	Thermal Magnetic	—	—	—	—	TJU	—	—	—	—
Ultra High I.C. Inverse Time	Electronic	—	T_U	—	—	—	TKU	—	—	TRUG

(1) 300…3000 A are electronic trip only as LSI or LSIG.

Notes:

Vertical Sections and IntelliCENTER Technology

Figure 2 - Parts Illustration Typical 15″ Deep Section Construction



Basic Sections and Structure Features/Modifications (SC-II and PE-II)

Table 10 -

Basic Sections		Delivery Program
Basic 20″ Wide Section	Includes standard features indicated in the tables below and on following pages. Maximum three 20″ wide sections per shipping split.	SC-II
25″, 30″, 35″ Wide Section	These sections do not have a vertical wireway. These sections require individual shipping splits.	
25″ Wide Section with 9″ Wireway	Section width is 25.″ Section has a 9″ wireway. Maximum of two 25″ wide sections with 9″ wireway per shipping split. Maximum of one 25″ wide section with 9″ wireway per shipping split with export packing, or NEMA Type 3R or NEMA Type 4 enclosure.	
Back-to-Back Section	There is no additional charge for assembling 15″ or 20″ deep sections back-to-back. Back-to-back construction consists of two separate sections mounted together, each with separate bus. Front and rear sections must be equal in width. Six 20″ wide sections per shipping split is maximum. A front-to-rear horizontal bus link is provided only when an incoming line lug compartment, main breaker, or main disconnect is selected. This splice link is located at the opposite end of the MCC from the incoming line section.	
Corner Section	Inside corner configuration is either 15″ deep by 25.125″ wide or 20″ deep by 30.125″ wide and is designed to contain power bus rated 600…2000 A only. There is no available space for the installation of units. Section does not have vertical wireway. See page 144 to select. Corner sections can be selected with an incoming line lug provision (see Bul. 2191M or 2191F, page 84), but are not available in either NEMA Type 3R, Type 4, or back-to-back construction.	
10″ Wide Incoming Lug Compartment	This section must be selected as part of a 2-section shipping split, **shipped attached to a 20,″ 25″ or 30″ wide section**. It cannot be selected as free standing or attached to a section with 9″ vertical wireway, any 35″ wide drive unit, full-section programmable controller, 1600 A and 2000 A 2192M, or 2000 A 2193M, and is not available in NEMA Type 3R, Type 4, or back-to-back construction. For selection information, refer to page 84.	PE-II
71″ High Section	This 70.48″ high × 15″ or 20″ deep section accommodates standard plug-in units up to and including 4.5 space factors. Standard height bus (45″ center point) and lower height bus (25.5″ center point) are available. Please note the following restrictions for 71″ high sections: – If top incoming (unless a full section incoming main lug is used) or top frame mounted device is required, select lower height bus. – If bottom incoming (unless full section incoming main lug is used) or bottom frame mounted device is required, select standard bus height. – If frame mounted transformer is required, select standard bus height. – If frame mounted transformer with top incoming main lug is required, select standard height bus and use a full section incoming main lug. – Two frame mounted units cannot be used in a single section. – Top frame mounted units and bottom frame mounted units cannot be mixed in the same line up (for example, Bulletin 2191, 2192, 2193, 2195, 2196, and 2197 units). – Only the following incoming main lug compartments are available pre-engineered: 300 A and 600 A in 1.0 space factors, 800 A in 1.5 space factors, 1200 A in 2.0 space factors, 600…2000 A full section 4.5 space factors. – 6.0 space factor, frame mounted units are not available. See publication 2100-TD024 for more information.	ENG
71″ High Back-to-Back Section	There is no additional charge for assembling 15″ or 20″ deep sections back-to-back. Back-to-back construction consists of two separate sections mounted together, each with separate bus. Front and rear sections must be equal in width. Six 20″ wide sections per shipping split is maximum. A front-to-rear horizontal bus link is provided only when an incoming line lug compartment, main breaker or main disconnect is selected. This splice link is located at the opposite end of the MCC from the incoming line section.	

Table 11 -

Section Features/Modifications		Delivery Program
Cabinet Depth	15″ deep	SC-II
	20″ deep	
Enclosure Type	NEMA Type 1	
	NEMA Type 1 with gasket (gasketed unit door areas)	
	NEMA Type 12 (totally gasketed enclosure with bottom closing plates)	
	NEMA Type 3R (non-walk-in) front mounted only. Available for internal sections, 30″ wide maximum. The external dimension of each NEMA Type 3R cabinet is 5″ wider than its internal section and 30″ deep (with 20″ deep internal section). Not available in back-to-back construction. Refer to publication 2100-TD025. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative for solid-state equipment (for example, variable frequency drives, SMCs, and PLCs).	PE-II
	NEMA Type 4 (non-walk-in) stainless steel, front mounted only. Available for internal sections, 30″ wide maximum. The external dimension of each NEMA Type 4 section is 5″ wider than its internal section and 30″ deep (with 20″ deep internal section). Not available in back-to-back construction. Refer to publication 2100-TD026. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative for solid-state equipment (for example, variable frequency drives, SMCs, and PLCs).	
Bottom Closing Plates	For NEMA Type 1 and Type 1 with gasket. Bottom closing plates are standard on NEMA Type 12.	SC-II
	For corner section NEMA Type 1 and Type 1 with gasket. Bottom closing plates are standard on NEMA Type 12.	
Drip Hood	Drip hood for NEMA Enclosure Type 1, Type 1 with gasket, and Type 12 only. (Not required for NEMA Type 3R or Type 4.) Drip hood is an overhang on top of a section, providing protection from limited amounts of liquid or dirt dripping and/or running down the front of a section. Select one drip hood per section. Not available for corner sections.	

Table 12 -

Section Features/Modifications, *continued*				Delivery Program
Power Bus Rating and Material[1] (For 3-phase, 3-wire systems)	Aluminum with tin plating [1]	0.125″ × 4″	600 A	SC-II
		0.188″ × 4″	800 A	
	Copper with tin plating	0.125″ × 3″	600 A	
		0.125″ × 4″	800 A	
		0.250″ × 4″	1200 A	
		0.500″ × 4″	1600 A	
		0.625″ × 4″	2000 A	
		0.75″ x 4″	2500 A	[3]
		0.75″ x 4″	3000 A[2]	[3]
	Copper with silver plating	0.125″ × 3″	600 A	PE-II
		0.125″ × 4″	800 A	
		0.250″ × 4″	1200 A	
		0.500″ × 4″	1600 A	
		0.625″ × 4″	2000 A	
		0.75″ x 4″	2500 A	[3]
		0.75″ x 4″	3000 A[2]	[3]

(1) Vertical bus is supplied as tin plated copper.

(2) Requires 20 in. deep MCC.

(3) PE-II for 2193M, ENG for 2191M, 2192M, and add to existing MCC.

Table 13 -

Section Features/Modifications, *continued*		Half-rated Neutral	Full-rated Neutral	Main Power Bus Rating	Delivery Program
Power Bus Rating and Material with Neutral Bus [1]	Aluminum with tin plating [2]	0.125″ x 4″	0.125″ × 4″	600 A	PE-II
		0.125″ x 4″	0.188″ × 4″	800 A	
(For 3-phase, 4-wire systems)	Copper with tin plating	0.125″ × 3″	0.125″ × 3″	600 A	
		0.125″ × 3″	0.125″ × 4″	800 A	
Neutral bus mounts above or below main power bus.		0.125″ x 4″	0.250″ × 4″	1200 A	
		0.188″ x 4″	0.500″ × 4″	1600 A	
		0.250″ x 4″	0.625″ × 4″	2000 A	
		0.250″ x 4″	0.750" x 4"	2500 A	(4)
		0.500″ x 4″	0.750" x 4"(3)	3000 A	(4)
	Copper with silver plating	0.125″ × 3″	0.125″ × 3″	600 A	PE-II
		0.125″ × 3″	0.125″ × 4″	800 A	
		0.125″ x 4″	0.250″ × 4″	1200 A	
		0.188″ x 4″	0.500″ × 4″	1600 A	
		0.250″ x 4″	0.625″ × 4″	2000 A	
		0.250″ x 4″	0.750" x 4"	2500 A	(4)
		0.500″ x 4″	0.750" x 4"(3)	3000 A	(4)

(1) When used with main incoming line (Bulletin 2191M), Main Switch (Bulletin 2192M) and Main Circuit Breaker (Bulletin 2193M) requires the selection of incoming neutral option (88HN or 88FN). Refer to Appendix, page 367, for neutral bus configuration information. Refer to page 161 for incoming neutral option selection.

(2) Vertical bus is supplied as tin plated copper.

(3) Requires 20 in. deep MCC.

(4) PE-II for 2193M, ENG for 2191M, 2192M, and add to existing MCC.

Table 14 -

Section Features, *continued*			**Delivery Program**
Vertical Bus Rating [1]	300 A tin plated copper vertical bus—0.75″ O.D., 0.625″ I.D. tube		SC-II
	600 A tin plated copper vertical bus—0.75″ O.D. rod		
	300 A silver plated vertical bus—0.75″ O.D., 0.625″ I.D. tube		PE-II
	600 A silver plated vertical bus—0.75″ O.D. rod		
Vertical Neutral Bus [2] Requires 25″ wide section with 9″ wireway	Tin plated copper bus. Mounted in and insulated from 9″ vertical wireway. Mechanically connected to horizontal neutral bus. Isolated from the rest of vertical wireway with barriers. To be used for connecting neutral loads or can be used for control voltages that require a connection to the neutral.	Rated 200 A (0.1875″ × 0.75″). For connection of control power neutral.	
		Rated 300 A (0.25″ × 1″). For connection of neutral loads.	
		Rated 600 A (0.25″ × 1″ qty. 2). For connection of neutral loads.	
Neutral Connection Plate [3]	0.25″ × 2″ × 12″ copper tin plated bus plate with #6-250 kcmil lug (280 A capacity). Insulated from and mounted to either top or bottom horizontal wireway.		SC-II
	0.25″ × 2″ × 12″ copper tin plated bus plate with #6-250 kcmil lug (280 A capacity). Insulated from and mounted to either top or bottom horizontal wireway. Cable connection provided to horizontal neutral bus. [2]		PE-II
	0.25″ x 2″ x 12″ copper silver plated bus plate with #6-250 kcmil lug (280 A capacity). Insulated from and mounted to either top or bottom horizontal wireway.		
	0.25″ x 2″ x 12″ copper silver plated bus plate with #6-250 kcmil lug (280 A capacity). Insulated from and mounted to either top or bottom horizontal wireway. Cable connection provided to horizontal neutral bus. [2]		

(1) Plating of horizontal bus and vertical bus must be the same.

(2) Requires horizontal neutral bus. See Power Bus Rating and Material with Neutral Bus in table above.

(3) A neutral connection plate can be used only in sections with a vertical wireway. Not available in sections with 6.0 space factor frame mounted units.
Not available in top of section with frame mounted unit mounted at top of section.
Not available in bottom of section with frame mounted unit mounted at bottom of section.

Table 15 -

Section Features/Modifications, *continued*				Delivery Program
Bracing [1]	42 kA (rms symmetrical)			SC-II
	65 kA (rms symmetrical)			
	100 kA series coordinated. Provides 65 kA (rms symmetrical) bracing in each section. Must be used in coordination with 600…2000 A horizontal bus and one of the following main incoming devices: 100, 200, 400, or 600 A, 2192M with Class R or J fusing 600, 800, 1200, 1600, or 2000 A, 2192M with Class L fusing THX or THXL 125 A Frame 2193M, 480V or less TJX or TJXL 250 A Frame 2193M, 480V or less TKX 400 A Frame 2193M, 480V or less TMX 800 A Frame 2193M, 480V or less TNX 1200 A Frame 2193M, 480V or less TKU 400 A Frame 2193M, 600V All starters and feeder units must have a short circuit withstand rating capable of interrupting the available fault current to the MCC.			
	100 kA fully braced			ENG
Ground Bus Unplated copper[2]	0.25″ × 1″ horizontal ground bus			SC-II
	0.25″ × 2″ horizontal ground bus			
	Two 0.25″ × 1″ horizontal ground bus top and bottom (cable interconnected)			
	Two 0.25″ × 2″ horizontal ground bus top and bottom (cable interconnected)			
Ground Bus Tin Plated copper[2]	0.25″ × 1″ horizontal ground bus			
	0.25″ × 2″ horizontal ground bus			
	Two 0.25″ × 1″ horizontal ground bus top and bottom (cable interconnected)			
	Two 0.25″ × 2″ horizontal ground bus top and bottom (cable interconnected)			
Vertical Ground Bus	0.188″ × 0.75″ vertical plug-in steel ground bus		Steel	
	0.188″ × 0.75″ vertical plug-in ground bus		Unplated copper	
	0.188″ × 0.75″ vertical ground bus for grounding unit load[3]			
	0.188″ × 0.75″ vertical plug-in ground bus		Tin plated copper	
	0.188″ × 0.75″ vertical ground bus for grounding unit load[4]			
Horizontal Power Bus Splice Kit	Splice bars, hardware, and installation instructions for 3-phase splicing. One kit required per shipping split on front mounted lineups. Two kits required per shipping split for back-to-back construction.	Aluminum tin plated bus	600 A	
			800 A	
		Copper tin plated bus	600 A	
			800 A	
			1200 A	
			1600 A	
			2000 A	
			2500 A	ENG
			3000 A	ENG
		Copper silver plated bus	600 A	PE-II
			800 A	
			1200 A	
			1600 A	
			2000 A	
			2500 A	ENG
			3000 A	ENG

(1) Contact your local Allen-Bradley distributor or Rockwell Automation sales representative when specifying 100 kA series coordinated bracing for 'Add to existing' sections.

(2) Standard ground bus lugs provided for horizontal ground bus options are: no main = no lug, 2191M = 1 lug, 2192M or 2193M = 2 lugs. Lugs accept one, #6AWG-250kcmil cable.

(3) Requires tin plating on plug-in unit ground stab.

(4) Requires tin plating on unit load ground connector.

Basic Sections and Structure Features/Modifications (SC-II and PE-II)

Table 16 -

Structure Features/Modifications, *continued*		Main Power Bus (Phase A, B, C) Rating and Material	Delivery Program
Horizontal Neutral Bus Splice Kit	Splice bar hardware (installation instructions included in power bus splice kit). One kit required per shipping split on front mounted lineups. Two kits required per shipping split for back-to-back construction.	600 A Aluminum with Tin Plating	PE-II
		800 A Aluminum with Tin Plating	
		600 A Copper with Tin Plating	
		800 A Copper with Tin Plating	
		1200 A Copper with Tin Plating	
		1600 A Copper with Tin Plating	
		2000 A Copper with Tin Plating	
		2500 A Copper with Tin Plating	ENG
		3000 A Copper with Tin Plating	ENG
		600 A Copper with Silver Plating	PE-II
		800 A Copper with Silver Plating	
		1200 A Copper with Silver Plating	
		1600 A Copper with Silver Plating	
		2000 A Copper with Silver Plating	
		2500 A Copper with Silver Plating	ENG
		3000 A Copper with Silver Plating	ENG

Basic Sections and Structure Features/Modifications (SC-II and PE-II)

Table 17 -

Section Features/Modifications, *continued*			Delivery Program
Horizontal Ground Bus Splice Kit	One —0.25″ × 1″ (unplated copper)	For applications utilizing ground bus mounted on both top and bottom or from back-to-back line ups, two ground bus splice kits are required for joining each shipping split.	SC-II
	Two —0.25″ × 1″ (unplated copper)		
	One —0.25″ × 1″ (tin plated copper)		
	Two —0.25″ × 1″ (tin plated copper)		
NO-OX-ID®	NO-OX-ID compound on vertical bus for section plug-in units		
Pullbox (1)	12″ high × 15″ deep or 20″ deep (except corner sections)		
Shutters	For isolation of plug-in stab openings—automatic		
	For isolation of plug-in stab openings—manual		
Protective Caps	For unused plug-in stab openings		
Unit Isolating Barriers	For closing the wire opening between unit and vertical wireway		
DeviceNet Connector Covers	For covering the unused DeviceNet connectors in the vertical wireway of a DeviceNet MCC		
Wireway Tie Bars	Five cable tie bars in vertical wireway		
Outgoing Equipment Ground Lug	One #6-250 kcmil lug mounted on horizontal ground bus in addition to lug provided		
T-Handle	T-handle latch on vertical wireway door		
Master Nameplates	Located on top horizontal wireway cover of the second vertical section in lineup, 2″× 6″		
Stainless Steel Nameplate Screws	Stainless steel nameplate screws for master nameplate (2 per nameplate)		
External Mounting Channel (2)	Two 1.5″ × 3″ mounting channels **IMPORTANT:** Adding an external mounting channel adds 1.5″ to height of section		
NEMA Type 3R Lifting Angle	Optional lifting angle for NEMA Type 3R cabinets only. This angle is not removable. **IMPORTANT:** Adding the lifting angle adds 3.63″ to the height of the section		PE-II
Space Heaters and Thermostat (Requires user supplied source of power)	Space heater with thermostat in each section	200 watt, 120 volt strip heater. Thermostat set at 21°C (70°F).	SC-II
	For two-section shipping split, one space heater is supplied in each section with a single thermostat control located in right-hand section		
	For three-section shipping split, one space heater is supplied in each section with a single thermostat control located in center section		
	Space heater with thermostat in each section	200 watt, 240 volt strip heater. Thermostat set at 21°C (70°F).	
	For two-section shipping split, one space heater is supplied in each section with a single thermostat control located in right-hand section		
	For three-section shipping split, one space heater is supplied in each section with a single thermostat control located in center section		
Export Packing Below Deck for Sections	Maximum 3-section shipping split. Shipping split is skid mounted and packaged in clear plastic. Packing is not watertight or waterproof. Skid is 2″ × 8″ construction according to shipping split size. Top is 2″ × 4″ frame with 0.438″ orientated strand board (OSB). Ends and sides covered with 0.438″ orientated strand board (OSB) with 2″ × 4″ cross members. Two steel bands around outside of container. Extended storage may require space heaters and other considerations.		SC-II (3)

(1) Available on NEMA Enclosure Type 1, Type 1 with gasket and Type 12 sections only.
(2) External mounting channel is shipped attached to MCC sections.
(3) Additional time required for export packing of SC-II and PE-II sections.

CENTERLINE 2100 Motor Control Center with IntelliCENTER Technology

Embedded Systems

CENTERLINE 2100 Motor Control Center with IntelliCENTER Technology provides CENTERLINE 2100 MCCs with sections having an Embedded System. The Embedded System can either be DeviceNet network or EtherNet/IP network.

- DeviceNet - The DeviceNet cabling, consisting of trunk line and drop lines, is routed through the sections and into the individual units, allowing the devices to communicate via DeviceNet. A complete DeviceNet system includes cabling, power supply, scanner module and the necessary DeviceNet components in the MCC units.
  - The DeviceNet trunk line is built in to the sections and routed behind barriers. The drop lines are routed from each unit to the DeviceNet connectors in the vertical wireway of each vertical section. The DeviceNet cable is rated 8 A, 600V for use with a Class 1 power limited circuit. Six DeviceNet connectors built into the back of the vertical wireway of each standard section provide a convenient method for the MCC units to connect to the trunk line.
- EtherNet/IP - The EtherNet/IP network consists of Ethernet cabling, Stratix switches, and a 24V DC Network. Cabling is routed through the sections and into individual units as described below.
  - For IntelliCENTER MCCs with EtherNet/IP network, the industrial Ethernet switches are mounted in either the top or bottom horizontal wireway or in a top or bottom unit. Depending on the number of intelligent devices, a switch group (the number of vertical sections connected to a single switch unit or wireway switch) can contain up to nine sections.
  - For wireway mounted industrial Ethernet switches, industrial Ethernet cables are routed from each unit to Ethernet adapters in the vertical wireway, or optionally, directly to the switch (homerun[(1)]). For top or bottom unit mounted Ethernet switches, Ethernet cables are routed from each unit directly to the Ethernet switch (homerun), or optionally, to adapters[(2)] in the vertical wireway of each section containing intelligent devices.
  - In either switch mounting configuration, 24V DC cables are routed from each unit to the 24V DC ports in the vertical wireway of each vertical section.
  - The Ethernet cable is both 600V AWM and Power Limited Tray Cable (PLTC) rated, along with being UL/cUL listed. The 24V DC Network consists of multiple 4-ampere networks designed to supply power to the switches and other EtherNet/IP components in the MCC. When specified, up to eight Ethernet adapters are built into the back of the vertical wireway of each standard section to provide a convenient method for the MCC units to connect to the EtherNet/IP network. Two pairs of 24V DC adapters, providing up to 8 device connections (4 device connections per pair) are always built into the back of the vertical wireway of each standard section to provide a convenient method for the MCC units to connect to the 24V DC power supply.

Intelligent Motor Control

- CENTERLINE 2100 MCCs with IntelliCENTER Technology offers Intelligent Motor Control components which provide vital information from the MCC via the Embedded System.
- IMC components consist of, but are not limited to:
  - E1 Plus solid-state overload relays
  - E3 solid-state overload relays
  - E300 solid-state overload relays
  - SMC-Flex Soft Starters
  - PowerFlex Variable Frequency Drives
  - PowerMonitor energy meters

(1) Available in CR2 for wireway mounted switch designs.

(2) Available in CR2 for unit mounted switch designs.

Software

- CENTERLINE 2100 MCCs with IntelliCENTER Technology offer remote visibility to the information from the IMC components via the Embedded System in the IntelliCENTER Software.
- IntelliCENTER Software provides real-time information as to the status of the IMC components as well as valuable documentation related to the MCC.

For more information on DeviceNet, refer to DeviceNet Media Design and Installation Manual, publication DNET-UM072, and DeviceNet Motor Control Centers, publication 2100-TD019.

For more information on Ethernet, refer to Converged Plantwide Ethernet (CPwE) Design and Implementation Guide, publication ENET-TD001, CENTERLINE Motor Control Centers with IntelliCENTER using an EtherNet/IP Network Information, publication MCC-RM001, and CENTERLINE 2100 Motor Control Centers with EtherNet/IP Network, publication 2100-TD031.

The CENTERLINE 2100 Motor Control Center with IntelliCENTER technology can consist of integrated hardware, software, and communication in one centralized package. The available IntelliCENTER software provides pre-configured screens which provide real-time data, trending, component history, wiring diagrams, user manuals, and spare parts. See page 42 for selection.

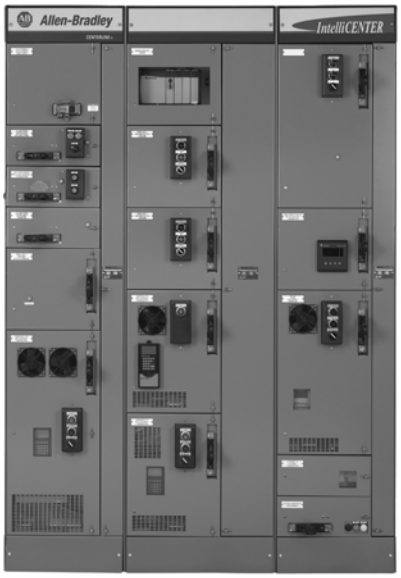


Table 18 - Available Networks

Section Features	Network	Description	Delivery Program
IntelliCENTER Technology	DeviceNet	Includes DeviceNet trunk line, drop cable from each unit to DeviceNet port in vertical wireway and plug-in terminating resistor kit.Includes DeviceNet node addressing per factory standards or per customer specified information. A single MCC is allowed to be configured to contain up to five independent networks. Maximum of 17 sections per network for MCCs on the SC or PE delivery program. IntelliCENTER software and documentation CD available, see description in Table 20. Available only for sections which contain horizontal power bus.	**SC-II**
	EtherNet/IP	Includes industrial Ethernet cables from each unit either directly to the industrial Ethernet switch (homerun configuration) or to the ports in the vertical wireway (adapter configuration). Includes 24V DC cables from each unit to the ports in vertical wireway. Includes EtherNet/IP addressing per customer specified information. A single MCC is allowed to be configured to contain up to ten independent networks. IntelliCENTER software and documentation CD available, see description in Table 20. Available only for sections that contain horizontal power bus.	**PE-II**

Table 19 - IntelliCENTER Technology Communication Card Information

EtherNet/IP IMC Device	Embedded EtherNet/IP	EtherNet/IP Card Option Required for Communication	EtherNet/IP Card Option	Description
PowerMonitor 5000	Yes	Yes	-86W54	Embedded Port is used to connect to Display when EtherNet/IP Card is not selected. Must select EtherNet/IP option to ensure ability to connect to Ethernet Switch supplied in Ethernet IntelliCENTER MCC.
E1 Plus	No	Yes	-ENET	Option provides 193-ENT E1 Plus Side Car.
E3 / E3+	No	Yes	-ENET	Option provides 2100-ENET EtherNet/IP adapter.
E300	Yes	No	-7FE3E	E300 is only available on EtherNet/IP at this time.
SMC Flex	No	Yes	-13GE	Option provides 20-COMM-E communication card.
PowerFlex 40	No	Yes	-14GE	Option provides 22-COMM-E communication card.
PowerFlex 523	No	Yes	-14GER	Option provides 25-COMM-E2P communication card.
PowerFlex 525	Yes	No	-14GER	EtherNet/IP port embedded. Option provides 25-COMM-E2P communication card.
PowerFlex 70	No	Yes	-14GE	Option provides 20-COMM-E communication card.
PowerFlex 700	No	Yes	-14GE	Option provides 20-COMM-E communication card.
PowerFlex 753	No	Yes	-14GER	Option provides 20-750-ENETR communication card.
PowerFlex 755	Yes	No	-14GER	EtherNet/IP port embedded. Option provides 20-750-ENETR communication card.

IntelliCENTER Software

IMPORTANT All IntelliCENTER software is copyright protected and for installation on one personal computer only.

Table 20 -

Description			Delivery Program
IntelliCENTER(1) Full Version Catalog Number: 2101A-INTLCNTR	The IntelliCENTER software replicates the MCC lineup on a computer screen, complete with nameplates and indicators on each door to show status (on, off, warning, fault, communication failure). Graphical views of individual MCC units display device data allowing users to quickly view critical amperes, time-to-trip, trip cause, ground fault amperes and on/off status. Each screen is pre-configured to show the parameters typically of greatest interest, and users can easily customize parameters. Many screens feature trending graphs and analog dials. The software also provides spare parts information, AutoCAD documentation, and event logging. Requires Documentation CD; see below. The IntelliCENTER software also contains ActiveX controls. This allows key views of the software to be displayed inside Human Machine Interfaces (HMIs) such as RSView.		SC
Standard Data CD(1) (2)	The Standard Data CD is the second component of the IntelliCENTER software. The CD contains data files specific to a particular MCC. This information includes unit nameplates, unit details, wiring diagrams, user manuals, spare parts, and other details.	Per MCC lineup Catalog Number: 2101A-INTLDOC-EN	SC
		Per unit Catalog Number: 2101A-INTLDOC-UN	SC
Energy Data CD(1)(2)(3) Catalog Number: 2101A-INTLNRGDOC-___	The Energy Data CD includes all of the components of the Standard Data CD. Additionally, it includes the ability to use the features of IntelliCENTER Energy (version 4.0 and later) as well as the additional installation software needed.	1	SC
		10	
		25	
		50	
		75	
		100	
		150	
		200	
		250	
		350	
		500	

(1) Must be ordered separately from MCC.

(2) Applies to either IntelliCENTER MCCs with DeviceNet or EtherNet/IP network.

(3) Catalog number is incomplete. Complete the catalog string with the number of metering devices in the MCC. (for example, if 8 metering devices are in the MCC, then 10 would be used and the catalog string would be 2101A-INTLNRGDOC-10.

System and Equipment Requirements for running IntelliCENTER Software

These minimum system requirements provide optimal operation of the IntelliCENTER software:

- Operating system: Windows XP SP3(1), Windows Vista SP2(1), Windows 7, Windows 8 or later
- Processor: 2 GHz minimum (2)
- Video resolution: 1024 x 768 resolution with True Color (24 bit or better)
- CD-ROM drive: 4X (16X recommended)
- Hard disk space: 3 GB free disk space
- Mouse: Microsoft compatible
- RAM: 2 GB minimum (4 GB recommended)

Equipment Necessary for Connection of a Computer via DeviceNet, ControlNet, or Ethernet:

DeviceNet

- Laptop computer: 1784-PCD DeviceNet PC interface card and 1784-PCD1 cable
- Desktop computer: 1784-PCIDS
- RS-232 interface (reduced performance): 1770-KFD DeviceNet interface module

TIP 2100H-ICPC120 patch cable is necessary for connecting interface (laptop, desktop, RS-232) to IntelliCENTER MCC wireway.

ControlNet

- Laptop computer: 1784-PCC ControlNet PC interface card and 1784-C1 cable
- Desktop computer: 1784-PCIC ControlNet PC interface card and 1786-TPR ControlNet tap

TIP Consult the ControlNet Coax Media Planning and Installation Guide, publication CNET-IN002, for configuration and installation of ControlNet cable.

Ethernet

- Laptop or desktop computer: consult local computer support personnel for Ethernet interface requirements

Recommended Additional Software

- RSNetWorx for DeviceNet—used for configuring DeviceNet nodes, saving parameters, and communicating to all types of DeviceNet components (sensors, non-Allen-Bradley products and other products not found in MCCs)
- RSNetWorx for ControlNet—used for configuring ControlNet devices including ControlNet to DeviceNet bridge

(1) Available with IntelliCENTER software version 5.xx and earlier.

(2) The IntelliCENTER software is a monitoring/communication software package requiring a very large amount of processor speed to function efficiently and quickly. The processor speeds listed allow the software to function correctly. However, for speed and efficiency, we recommend that the processor used be the fastest processor available to you.

Notes:

Chapter 3

Safety Technology

ArcShield Technology

ArcShield™ is an optional Safety Technology feature that helps to provide a safer working environment by controlling and diverting the incident energy during an arc flash event. The CENTERLINE 2100 MCC with ArcShield has been tested in accordance with the IEEE C37.20.7 standard for Type 2 accessibility. Type 2 accessibility allows personnel to be protected while in front, at the side, or in the rear of the enclosure in the event of an arcing fault.

ArcShield helps contain arc faults by two methods:

- Specific devices that help limit the amount of available arc fault current distributed through the MCC (Device Limited).

  The devices used in device-limited motor control centers include:
  - UL Listed Devices:
    Class L - A4BQ ≤ 1200 A
    Class R - Any fuse ≤ 600 A
    Class J - Any fuse ≤ 600 A
  - UL Listed Molded Case Circuit Breakers:
    Allen-Bradley - Bulletin 140G
- Structures and features of the MCC are tested to contain and withstand an arc fault in a specified time duration (100 ms). The 100 ms time duration is the maximum allotted time for an overcurrent and/or short-circuit protective device to clear a fault. The time duration allows the MCC to maintain the arc resistant rating that is described in IEEE C37.20.7 with Type 2 accessibility.

Table 21 - ArcShield Availability

Structure	Device Limited[2], [3], [4]	100ms Duration Limited[2], [3], [4]
Enclosure		
NEMA 1	Yes	Yes[7]
NEMA 1G	Yes[5]	Yes [7]
NEMA 3R	Yes	No
NEMA 12	Yes[7]	Yes [7]
Section Depth	15 in. or 20in.	20 in.
Section Width	20…35 in.	20…35 in.
Section Height	71 in. or 90 in.	90 in.
Back-to-Back	Yes	Yes
Door Mounted Devices	Yes	Yes

Table continued on the next page.

Table 21 - ArcShield Availability

Structure	Device Limited[2], [3], [4]	100ms Duration Limited[2], [3], [4]
Vented Units	Yes[6]	No
1/2 Space Factor Units	Yes	No
Top-Plate Pressure Relief	No	Yes
Vertical Wireway Baffle	Not Required	Required
Arc Containment Latches	2 Latches / Door	All Latches
Unit Support Pans	Bolted	Bolted
Electrical		
Bus Voltage	Up to 600V	Up to 480V
Available Fault Current	Up to 65 kA	Up to 65 kA
Horizontal Bus Current Rating[1]	Up to 1200 A	Up to 3000 A
Horizontal Ground Bus	Top or Bottom or Both	Top and Bottom
Vertical Bus Shutters	Automatic / Manual	Automatic / Manual
Vertical Plug-in Ground Bus	Copper or Copper/Tin	Copper or Copper/Tin
Vertical Load Ground Bus	Optional	Copper or Copper/Tin

(1) 100% rated circuit breakers mains not available.
(2) Duration Limited is available as PE delivery program (without baffles). Duration Limited is ENG.
(3) For unit configurations, see option -112A.
(4) Refer to Commercial Engineering for application notes.
(5) 20" deep only.
(6) Arc-resistent baffles are required. Note that baffles are not available on blank doors or empty units.
(7) No units with door mounted filters.

Table 22 - Unit Available with ArcShield

Availablility with These Units	Device Limited[1], [2], [3]	100ms Duration Limited[1], [2], [3]
SecureConnect	Yes	Yes
IntelliCENTER Technology	Yes	Yes
Drives	Yes	Yes[5]
SMCs	Yes	Yes[5]
Starters	Yes	All
Mains and Feeders	Yes [4]	Yes [4]
Dual Units	No	No

(1) Duration Limited is available as PE delivery program (without baffles). Duration Limited is ENG.
(2) For unit configurations, see option -112A.
(3) Refer to Commercial Engineering for application notes.
(4) Not available with R-Frame or ACBs.
(5) Not available on NEMA 1 if the NEMA 12 version requires venting. Not available on NEMA 12 if venting is required.

SecureConnect

SecureConnect™ is an optional Safety Technology feature for plug-in units which allows the unit to be electrically isolated from the vertical power bus before the enclosure door is opened.

SecureConnect features include the follow:

- Multi-point validation system with both electrical and mechanical indications.
- Integrated shutters for improved isolation while the unit is still installed.
- Snap-action power stab disconnect limits arcing during disconnect.
- Standard ¼" hex wrench operation. No special tools required.
- Lock-Out-Tag-Out mechanism to prevent re-connection and increase safety.

Application features:

- Not available on 0.5 space factor units.
- Auto shutters are required.

Table 23 - SecureConnect Availability

Bulletin	Size 1	Size 2	Size 3	Size 4	Size 5
2106/2107	✓	✓	✓	✓	--
2112/2113	✓	✓	✓	✓	--
2122/2123	✓	✓	✓	✓	--
2152/2153	✓	✓	✓	✓	--
2162/2163	✓	✓	✓	--(1)	--

	30 A	60 A	100 A	200 A	400 A
2192	✓	✓	✓	✓	--(1)

	G-Frame / H-Frame	J-Frame	K-Frame
2193	✓(2)	✓	--

(1) SecureConnect is not applicable to frame-mount units.

(2) Not available with 3 A and 7 A MCP circuit breakers.

Notes:

Chapter 4

Units

Please read this important information for ordering units

- Configure sections separately from units

  Units having network options, ordered separately from vertical sections, are supplied with a 48" patch cable for connecting the device to a port in the vertical wireway of the existing CENTERLINE 2100 MCC with IntelliCENTER technology.
- Wiring Type

  Units are available with either Type A or Type B wiring. Catalog numbers are for Type B wiring. To order Type A wired units, substitute the letter B in the catalog number with the letter A.
- Unit configurations include door, unit support pan, hinges, and hinge pins
- Overload Relays

  Starter units include E1+ electronic overload relays, that are RoHS compliant, as standard. See Options section for electronic overload relays.
- Heater Elements

  Heater elements are offered on pages 343 through 350.
- Power Fuses

  Factory installed power fuses are available for most fusible units. See pages 316…317 for selection.
- Delivery Programs

  Delivery programs are listed in tables under the column marked 'Delivery Program'. See page 15 for more delivery program information.
- 71" High Sections

  71" high sections accommodate 4.5 space factor (maximum) units. For 71" high section restrictions, see page 32.

Figure 3 - Bulletin 2112, Size 1, FVNR with Transformer Shown

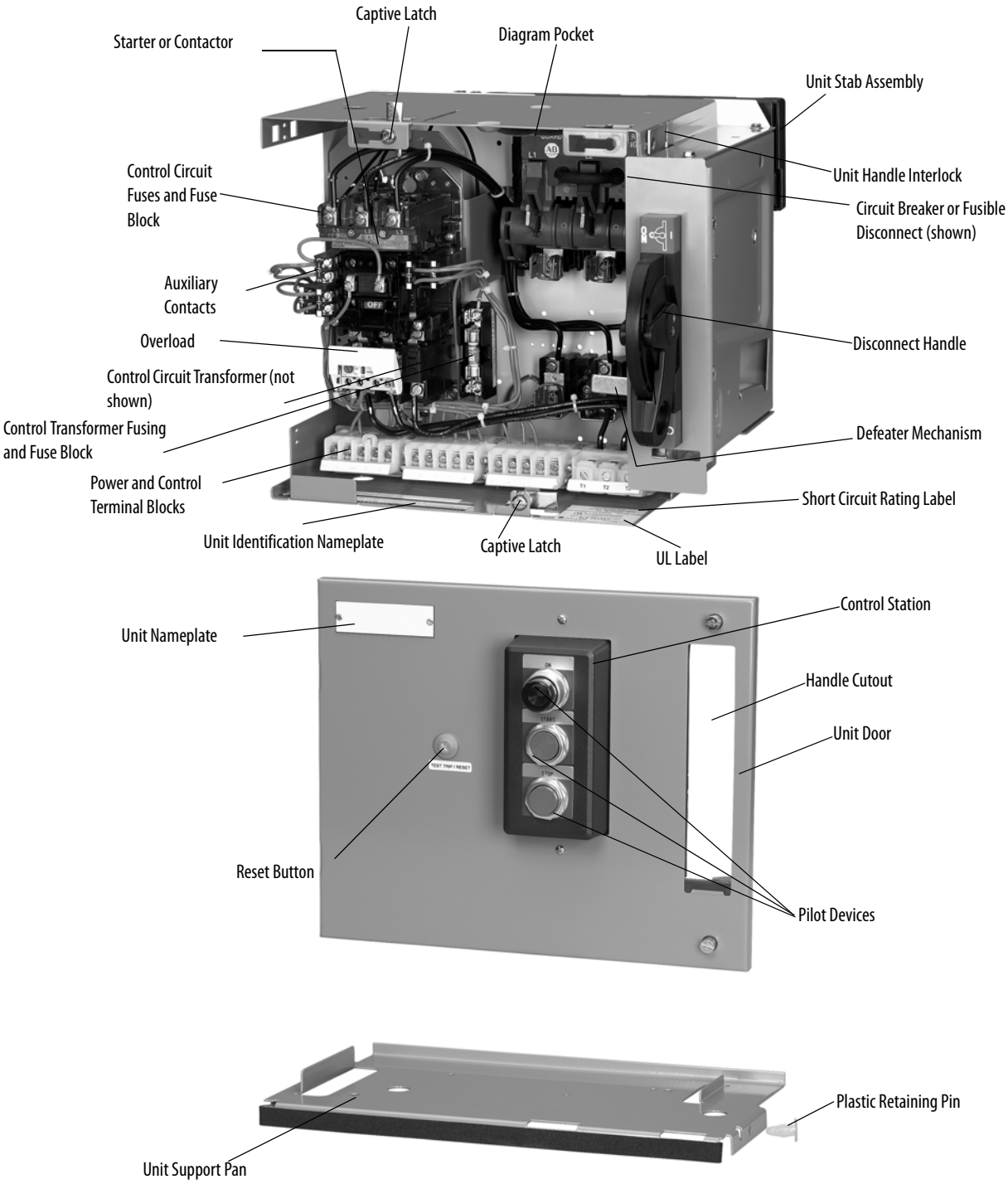
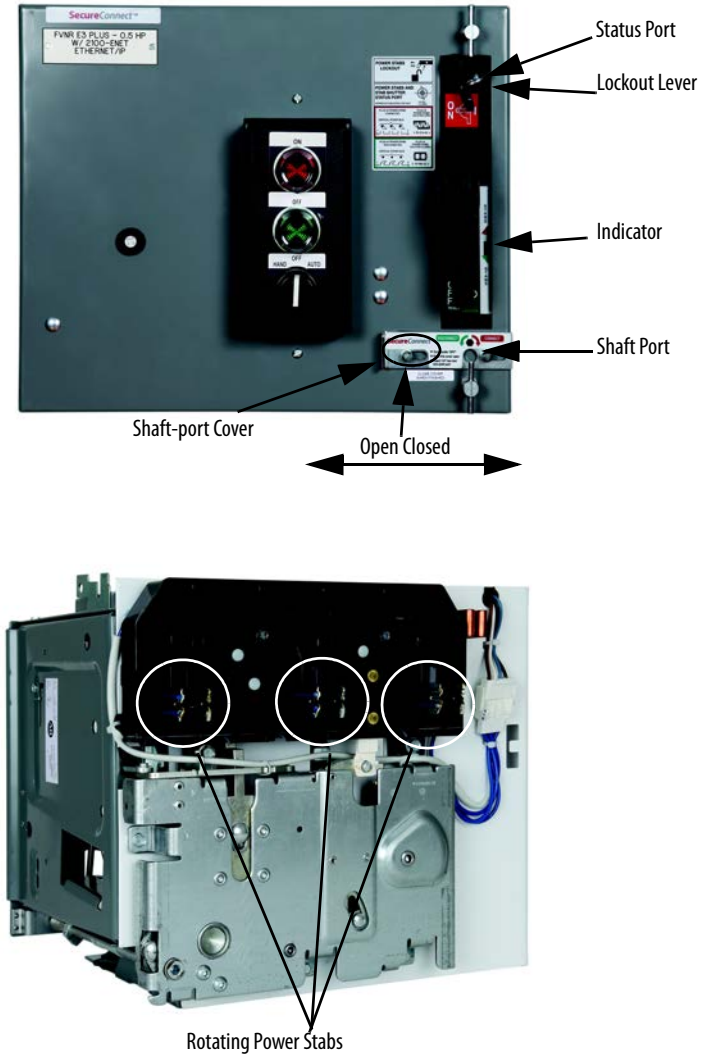


Figure 4 - SecureConnect Unit



Notes:

Contactor and Starter Units

Bulletin 2102L and 2103L Combination Full-Voltage Lighting Contactor Units (FVLC)

These combination lighting contactor units are supplied with an Allen-Bradley Bulletin 500L AC contactor and either a fusible disconnect or circuit breaker. They are rated 30…300 A. Each unit is provided as a NEMA Class I, Type B-T unit with terminals mounted in the unit for connection to remote devices.

Catalog Number Explanation - Bulletin 2102L and 2103L Full Voltage Lighting Contactors (FVLC)

- Allen-Bradley Bulletin 500L AC contactor with a fusible disconnect or circuit breaker
- Rated 30…300 A
- NEMA Class I, Type B with terminals mounted on the unit

Table 24 -

2102L / 2103L													
2102L	B	-	B	K	B	-	24J	-	6P
2103L	B	-	B	K	B	-	30THM	-	6P
Bulletin Number	Wiring Type		Rating Amperes	NEMA Enclosure Type	Control Voltage Type		Fuse Clip Ratings and Class or Trip Current and Circuit Breaker Type		Option

Code	Type
2102L	Full Voltage Lighting Contactor (FVLC) with Fusible Disconnect
2103L	Full Voltage Lighting Contactor (FVLC) with Circuit Breaker

Code	Wiring Type
A	Type A
B	Type B

Code	Rating Amperes
Z	30 A (0.5 Space Factor)
B	30 A
C	60 A
D	100 A
E	200 A
F	300 A

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Control Voltage Type
See Table on Page 313	

Code	Option
See Options section beginning on Page 145.	

Code	Fuse Clip Ratings and Class or Trip Current Circuit Breaker Type
2102L - '24J'	Fuse Clip Rating and Class. See Table on page 317
2103L - '30THM'	Trip Current and Circuit Breaker Type. See Table on page 319 and table on page 320.

Bulletin 2102L Full Voltage Lighting Contactor Unit with Fusible Disconnect Switch (FVLC)

- See page 53 for product description.
- For unit sizing, select unit rating based on 125% of actual load amperes.
- Basic configuration includes three power poles and one hold-in contact.

IMPORTANT To address the heating effects from loads containing a high degree of harmonic content, it may be necessary to oversize the field conductors (especially neutrals), use k-factor lighting transformers and oversize the lighting contactor units (increase by 50%); for high harmonic load applications, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Table 25 -

Rating (Amperes) (1)	Transformer Primary Switching kVA (3)										Fuse Clip (See Appendix for short circuit withstand ratings.)		Space Factor	Catalog Number (4) Wiring Type B—Class I		Delivery Program
	208V		240V		380V...415V		480V		600V					NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
	1∅	3∅	1∅	3∅	1∅	3∅	1∅	3∅	1∅	3∅	Rating (Amperes)	Class				
30 (2)	1.2	3.6	2.4	4.3	2.8	7.1	4.9	8.5	6.2	11	30	CC, J	0.5	2102LB-ZK_-___	2102LB-ZJ_-___	SC
30	1.2	3.6	2.4	4.3	2.8	7.1	4.9	8.5	6.2	11	30	CC, J, R, H	1.0	2102LB-BK_-___	2102LB-BJ_-___	
60	2.1	6.3	4.1	7.2	6.8	11.8	8.3	14	10	18	30 60	J, R, H	1.0	2102LB-CK_-___	2102LB-CJ_-___	
100	4.1	12	8.1	14	13.3	23.3	16	28	20	35	60 100		2.5	2102LB-DK_-___	2102LB-DJ_-___	
200	6.8	20	14	23	22.5	39	27	47	34	59	100 200		3.0	2102LB-EK_-___	2102LB-EJ_-___	PE
300	14	41	27	47	45	78.3	54	94	68	117	200 400		4.0	2102LB-FK_-___	2102LB-FJ_-___	

(1) Ampere ratings apply to non-motor loads such as fluorescent ballasts, mercury vapor lamps and resistive heating. Tungsten lamp current ratings are limited to applications 480V line-to-line (277V line-to-neutral) maximum.

(2) Separate or transformer control only, except 208V (where separate control only). These units have horizontal handles, Bulletin 194R fused disconnect switch, up to four Bulletin 800F pilot devices and one 10-pt. pull-apart control terminal block with #16 AWG control wire only. One 3-pole power terminal block is supplied as standard.

(3) Ratings are based on the contactor being used to switch transformers having an inrush of not more than 20 times their rated full load current, regardless of the nature of the secondary load. Ratings do not apply to transformers used in resistance welder service.

(4) The catalog numbers listed are not complete:
- Select control voltage type from table on page 313 (for example, 2102LB-BK**BD**).
- Select fuse clip rating, class, and designator from the table on page 317 for configuration.
- To select optional power fuse, select from table on page 317 (for example, 2102LB-BKBD-24J-**607G**).
- For fuse rating, based on disconnect rating see publication 2100-TD003.

Bulletin 2103L Full Voltage Lighting Contactor Unit with Circuit Breaker (FVLC)

- See page 53 for product description.
- For unit sizing, select unit rating based on 125% of actual load amperes.
- Basic configuration includes three power poles and one hold-in contact.
- Includes line terminal guards for circuit breakers on all units.

IMPORTANT To address the heating effects from loads containing a high degree of harmonic content, it may be necessary to oversize the field conductors (especially neutrals), use k-factor lighting transformers and oversize the lighting contactor units (increase by 50%).

Table 26 -

Rating (Amperes) (1)	Transformer Primary Switching kVA (5)										Space Factor	Catalog Number (6) Wiring Type B—Class I		Delivery Program
	208V		240V		380V–415V		480V		600V					
	1∅	3∅	1∅	3∅	1∅	3∅	1∅	3∅	1∅	3∅		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
30 (2)	1.2	3.6	2.4	4.3	2.8	7.1	4.9	8.5	6.2	11	0.5	2103LB-ZK_-__	2103LB-ZJ_-__	SC
30	1.2	3.6	2.4	4.3	2.8	7.1	4.9	8.5	6.2	11	1.0	2103LB-BK_-__	2103LB-BJ_-__	
DUAL 30 (3)	1.2	3.6	2.4	4.3	2.8	7.1	4.9	8.5	6.2	11	1.5	2103LB-BK_-__ (7)	2103LB-BJ_-__ (7)	
60	2.1	6.3	4.1	7.2	6.8	11.8	8.3	14	10	18	1.0	2103LB-CK_-__	2103LB-CJ_-__	
100 (4)	4.1	12	8.1	14	13.3	23.3	16	28	20	35	1.5	2103LB-DK_-__	2103LB-DJ_-__	
200	6.8	20	14	23	22.5	39	27	47	34	59	2.5	2103LB-EK_-__	2103LB-EJ_-__	PE
300	14	41	27	47	45	78.3	54	94	68	117	3.5	2103LB-FK_-__	2103LB-FJ_-__	

(1) Ampere ratings apply to non-motor loads such as fluorescent ballasts, mercury vapor lamps and resistive heating. Tungsten lamp current ratings are limited to applications 480 volts line-to-line (277 volts line-to-neutral) maximum.

(2) Separate or transformer control only, except 208V (where separate control only). These units have horizontal handles, up to four Bulletin 800F pilot devices and one 10-pt. pull-apart control terminal block with #16 AWG control wire only. One 3-pole power terminal block is supplied as standard.

(3) Dual mounted unit supplied without power terminal blocks.

(4) 100 A unit with transformer control (option -6P or -6XP) increases space factor from 1.5 to 2.0.

(5) Ratings are based on the contactor being used to switch transformers having an inrush of not more than 20 times their rated full load current, regardless of the nature of the secondary load. Ratings do not apply to transformers used in resistance welder service.

(6) The catalog numbers listed are not complete:
- Select control voltage type from table on page 313 (for example, 2103LB-BK**BD**).
- Select trip current from table on page 319 (for example, 2103LB-BKBD-**30**).
- Select circuit breaker from Circuit Breaker Type table on page 320 (for example, 2103LB-BKBD-30**THM**).

(7) To dual mount combination lighting contactors in one unit:
- Select two trip current numbers from table on page 319 (for example, 2103LB-BKBD-**3032**).
- Then select circuit breaker from Circuit Breaker Type table on page 319 (for example, 2103LB-BKBD-3032**THM**).

Bulletin 2106 and 2107 Combination Full Voltage Reversing Starter Units (FVR)

These combination full voltage reversing starter units are supplied with an Allen-Bradley Bulletin 505 reversing starter and either a fusible disconnect or a circuit breaker. The Bulletin 2106 and 2107 starters are rated for NEMA sizes 1 through 5 and are mechanically and electrically interlocked to avoid both contactors being closed simultaneously. Each unit is provided as a NEMA Class I, Type B-T unit with terminals mounted in the unit for connection to remote devices. Full voltage reversing starter units are available with a eutectic alloy or electronic overload relay.

Catalog Number Explanation - Bulletin 2106 and 2107 Full Voltage Reversing Starters (FVR)

- Allen-Bradley Bulletin 505 reversing starter with a fusible disconnect or circuit breaker
- NEMA Sizes 1…5
- NEMA Class I, Type B wiring with terminals mounted in the unit
- Available with eutectic alloy, E1 Plus or E3 Plus electronic overload relays

Table 27 -

2106	B	-	B	A	B	-	41-24J	-	6P
2107	B	-	B	A	B	-	41TGA	-	6P
Bulletin Number	Wiring Type		NEMA Size	NEMA Enclosure Type	Control Voltage Type		Horsepower and Disconnecting Means		Options

Code	Type
2106	Full Voltage Reversing (FVR) with Fusible Disconnect
2107	Full Voltage Reversing (FVR)) with Circuit Breaker

Code	Wiring Type
A	Type A
B	Type B

Code	NEMA Size
B	1
C	2
D	3
E	4
F	5

Code	NEMA Enclosure Type
A	NEMA Type 1 or Type 1 with gasket with external reset button
K	NEMA Type 1 or Type 1 with gasket without external reset button
D	NEMA Type 12 with external reset button
J	NEMA Type 12 without external reset button

Code	Control Voltage Type
See Table on Page 313	

Code	Options
See Options section beginning on Page 145.	

Code	Fuse Clip Ratings and Class or Trip Current Circuit Breaker Type
2106 - '41-24J'	'41' Horsepower Code. See Horsepower Table on Page 314. '24J' Fuse Clip Rating and Class See Fuse Clip Designator table on page 316
2107 - '41TGA'	'41_' Horsepower Code. See Horsepower Table on page 314 '_TGA' Circuit Breaker Type. See Table on Circuit Breaker Type Table on page 320.

Bulletin 2106 Full Voltage Reversing Starter Unit with Fusible Disconnect Switch (FVR)

See page 56 for product description.

Table 28 -

NEMA Size	Horsepower				Fuse Clip (See Appendix for short circuit withstand ratings.)		Space Factor	Catalog Number (4) Wiring Type B—Class I		Delivery Program
	208V	240V	380V… 415V	480V/600V	Rating (Amperes)	Class		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
1	0.125…7.5	0.12…-7.5	0.125…10	0.125…10	30	CC, J, R, H, HRCII-C	1.5	2106B-BA_-___	2106B-BD_-___	SC
					60	J, R, H, HRCII-C				
2	10	10…15	15…25	15…25	30 (1) 60 100	J, R, H, HRCII-C J, R, H, HRCII-C J	1.5	2106B-CA_-___	2106B-CD_-___	
					100	R, H, HRCII-C	2.0 (2)			
3	15…25	20…30	30…50	30…50	60 (1) 100 200	J, R, H, HRCII-C J, R, H, HRCII-C J, R, H, HRCII-C	3.0	2106B-DA_-___	2106B-DD_-___	
4	30…40	40…50	60…75	60…100	100 (1) 200 400	J, R, H, HRCII-C J, R, H, HRCII-C J	4.0	2106B-EA_-___	2106B-ED_-___	
5	50…75	60…100	100…150	125…200	200 (1) 400 600	J, R, H, HRCII-C J, R, H, HRCII-C J	6.0 (3), 20″W	2106B-FA_-___	2106B-FD_-___	PE-II

(1) Available on 480V and 600V applications only.
(2) For 208V and 240V applications with Class R or H fuses, unit only requires 1.5 space factors.
(3) Frame mounted unit, section does not have vertical wireway.
(4) The catalog numbers listed are not complete:
- Select control voltage type from table on page 313 (for example, 2106B-BA**BD**).
- Select horsepower from table on page 314 (for example, 2106B-BABD-**31**).
- If power fuse is NOT selected, select fuse clip from Table 28. Then select clip designator from table on page 316 (for example, 2106B-BABD-31-**24J**).
- If power fuse is selected, first select clip designator from table on page 316 (for example, 2106B-BABD-31___-**20J**). Then, select power fuse from table on page 316 (for example, 2106B-BABD-31GT-20J).
- For fuse rating based on load horsepower, see publication 2100-TD003.

IMPORTANT The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers without the external reset button, replace the letter 'A' with the letter 'K' (for example, 2106B-BK_-___) or replace the letter 'D' with the letter 'J' (for example, 2106B-BJ_-____).

Bulletin 2107 Full Voltage Reversing Starter Unit with Circuit Breaker (FVR)

See page 56 for product description.

Includes line terminal guards for circuit breakers on all unit.

Table 29 -

NEMA Size	Horsepower				Space Factor	Catalog Number [4] Wiring Type B—Class I		Delivery Program
	208V	240V	380…415V	480V/600V		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
1	0.125…7.5	0.125…7.5	0.125…10	0.125…10	1.5	2107B-BA_-___	2107B-BD_-___	SC
2	10	10…15	15…25[1]	15…25	1.5	2107B-CA_-___	2107B-CD_-___	
3	15…25	20…30	30…50[2]	30…50	2.5	2107B-DA_-___	2107B-DD_-___	
4	30…40	40…50	60…75	60…100	4.0	2107B-EA_-___	2107B-ED_-___	
5	50…75	60…100	100…150	125…200	6.0 [3], 20″W	2107B-FA_-___	2107B-FD_-___	PE-II

(1) 25hp at these voltage ratings are not UL listed. Per US NEC, if unit will be installed in the USA it must utilize a Inverse Time (Thermal Magnetic or Electronic) breaker; MCP breaker are non-compliant with US NEC for these units.

(2) 50hp at these voltage ratings are not UL listed. Per US NEC, if unit will be installed in the USA it must utilize a Inverse Time (Thermal Magnetic or Electronic) breaker; MCP breaker are non-compliant with US NEC for these units.

(3) Frame mounted unit, section does not have vertical wireway.

(4) The catalog numbers listed are not complete:

- Select control voltage type from table on page 313 (for example, 2107B-BA**BD**).
- Select horsepower from table on page 314 (for example, 2107B-BABD-**30**).
- Select circuit breaker type from Circuit Breaker Type table on page 320 (for example, 2107B-BABD-30**TGA)**.
- For circuit breaker size based on load horsepower, refer to publication 2100-TD032.

IMPORTANT The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers without the external reset button, substitute the letter 'A' with the letter 'K' (for example, 2107B-BK_-___) or replace the letter 'D' with the letter 'J' (for example, 2107B-BJ_-____).

Bulletin 2106 and 2107 Space Saving NEMA Combination Full Voltage Reversing Starter Units (FVR)

These combination full voltage reversing starter units offer a space saving alternative while utilizing an Allen-Bradley Bulletin 300 reversing starter and either a fused disconnect or a circuit breaker. The Bulletin 2106 Space Saving NEMA reversing starters are rated for NEMA Size 1 applications and the Bulletin 2107 Space Saving NEMA reversing starters are rated for NEMA Size 1…3 applications. The contactors are mechanically and electrically interlocked to avoid both contactors being closed simultaneously. Each unit is provided as a NEMA Class I, Type B-D unit with terminals mounted in the unit for connections to remote devices. These full voltage reversing units are available with electronic overload relays.

Catalog Number Explanation - Space Saving NEMA Bulletin 2106 and 2107 Full Voltage Reversing Starters (FVR)

- Allen-Bradley Bulletin 300 starter with fused disconnect or circuit breaker
- NEMA Class 1, Type B-D unit with terminals mounted in unit
- Available with electronic overload relays
- Space saving alternative to traditional NEMA starter units

Table 30 -

2106	**B**	-	**3B**	**A**	**B**	-	**38-24J**	-	**
2107	**B**	-	**3B**	**A**	**B**	-	**38TGA**	-	**
Bulletin Number	Wiring Type		NEMA Size	NEMA Enclosure Type	Control Voltage Type		Horsepower and Disconnecting Means		Option

Code	Type
2106	Full Voltage Reversing (FVR) with Fused Disconnect
2107	Full Voltage Reversing (FVR) with Circuit Breaker

Code	Wiring Type
B	Type B-D

Code	NEMA Size
3B	1
3C	2
3D	3

Code	NEMA Enclosure Type
A	NEMA Type 1 or Type 1 with gasket with external reset button
K	NEMA Type 1 or Type 1 with gasket without external reset button
D	NEMA Type 12 with external reset button
J	NEMA Type 12 without external reset button

Code	Control Voltage Type
See Table on page 313.	

Table 31 -

Code	Horsepower Code and Disconnecting Means
2106 - '38-24J'	'38' Horsepower Code. See Table on page 314. '24J' Fuse Clip Rating and Class. See Table on page 316.
2107 - '38TGA'	'38_' Horsepower Code. See Table on page 314. '_TGA' Circuit Breaker Type. See Table on page 320.

Table 32 -

Code	Option
See Options section beginning on page 171.	

Bulletin 2106 Space Saving NEMA Full Voltage Reversing Starter Unit with Fused Disconnect Switch (FVR)

- See page 56 for product description.
- Units are cULus listed, unless otherwise indicated.

Table 31 -

NEMA Size	Horsepower		Fuse Clip (See Appendix for short circuit withstand ratings.)		Space Factor	Catalog Number (2) Wiring Type B—Class I		Delivery Program
	480V	600V	Rating (Amperes)	Class		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
1	0.5…10	0.75…10	30	CC, J, HRCII-C	0.5(1)	2106B-3BA_-___	2106B-3BD_-___	SC

(1) These units have horizontal operating handles, Bulletin 194R fused disconnect, up to four Bulletin 800F pilot devices, #16 AWG control wire and one 10-point control terminal block (Type B-D only in Type B units). See page 27 or information on installation into series E-J sections.

(2) The catalog numbers listed are not complete:
- Select control voltage type from table on page 313 (for example, 2106B-3BA**BD**).
- Select horsepower from table on page 314 (for example, 2106B-3BABD-**38**).
- Select fuse class. Then select clip designator from table on page 316 (for example, 2106B-3BABD-38-**24J**).

IMPORTANT The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers without the external reset button, substitute the letter 'A' with the letter 'K' (for example, 2106B-3BK_-___) or replace the letter 'D' with the letter 'J' (for example, 2106B-3BJ_-___)

Bulletin 2107 Space Saving NEMA Full Voltage Reversing Starter Unit with Circuit Breaker (FVR)

- See page 56 for product description.
- Units are cULus listed, unless otherwise indicated.
- Includes line terminal guards for circuit breakers on all units.

Table 32 -

NEMA Size	Horsepower		Space Factor	Catalog Number (3) Wiring Type B—Class I		Delivery Program
	480V	600V		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
1	0.5…10	0.75…10	0.5(1)	2107B-3BA_-___	2107B-3BD_-___	SC
2	15…25	15…25	1.0(2)	2107B-3CA_-___	2107B-3CD_-___	
3	30…50	30…50	1.5(2)	2107B-3DA_-___	2107B-3DD_-___	

(1) These units have horizontal operating handles, up to four Bulletin 800F pilot devices, #16 AWG control wire and one 10-point control terminal block (Type B-D only in Type B units). See page 27 for information on installation into series E-J sections.

(2) These units have horizontal operating handles, up to six Bulletin 800F pilot devices, #16 AWG control wire and one 10-point control terminal block (Type B-D only in Type B units). See page 27 for information on installation into series E-J sections.

(3) The catalog numbers listed are not complete:
- Select control voltage type from table on page 313 (for example,, 2107B-3BA**BD**).
- Select horsepower from table on page 314 (for example, 2107B-3BABD-**38**).
- Select circuit breaker type from Circuit Breaker Type table on page 320 (for example, 2107B-3BABD-38**TGA**).

IMPORTANT The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers without the external reset button, substitute the letter 'A' with the letter 'K' (for example, 2107B-3BK_-___) or replace the letter 'D' with the letter 'J' (for example, 2107B-3BJ_-___).

Bulletin 2112, 2112 Vacuum, and 2113, 2113 Vacuum Combination Full Voltage Non-reversing Starter Units (FVNR)

These combination full voltage non-reversing starter units are supplied with an Allen-Bradley Bulletin 509 starter (starter units with vacuum contactors use Allen-Bradley Bulletin 1102C contactors) and either a fusible disconnect or a circuit breaker. The full voltage non-reversing starters are rated for NEMA sizes 1…6 (starter units with vacuum contactors are rated 200 A, 400 A, or 600 A). Each unit is provided as a NEMA Class I, Type B-T unit, with terminals mounted in the unit for connection to remote devices. Full voltage non-reversing starter units are available with a eutectic alloy or electronic overload relay.

Catalog Number Explanation - Bulletin 2112, 2112 Vacuum, and 2113, 2113 Vacuum Combination Full Voltage Non-reversing Starter Units (FVNR)

- Allen-Bradley Bulletin 509 starter with a fusible disconnect or circuit breaker (Bulletin 2112 and 2113 Vacuum use Allen-Bradley Bulletin 1102C vacuum contactors)
- NEMA Class I, Type B unit with terminals mounted in the unit
- Available with eutectic alloy or electronic overload relays.

Table 33 -

2112	B	-	B	A	B	-	41-24J	-	6P
2113	B	-	B	A	B	-	41TGA	-	6P
Bulletin Number	Wiring Type		NEMA Size	NEMA Enclosure Type	Control Voltage Type		Horsepower and Disconnecting Means		Options

Code	Type
2112	Full Voltage Non-reversing (FVNR) with Fusible Disconnect
2113	Full Voltage Non-reversing (FVNR)) with Circuit Breaker

Code	NEMA Size
Z	1 (0.5 Space Factor)
B	1
C	2
D	3
E	4
F	5
G	6

Code	Control Voltage Type
See table on Page 313	

Code	Options
See Options section beginning on Page 145.	

Code	Fuse Clip Ratings and Class or Trip Current Circuit Breaker Type
2112 - '41-24J'	'41' Horsepower Code. See table on Page 314 '24J' Fuse Clip Rating and Class. See Fuse Clip Designator table on page 316
2113 - '41TGA'	Horsepower Code. See table on page 314 '_TGA' Circuit Breaker Type. See Circuit Breaker Type table on page 320.

Code	Wiring Type
A	Type A
B	Type B

Code	NEMA Enclosure Type
A	NEMA Type 1 or Type 1 with gasket with external reset button
K	NEMA Type 1 or Type 1 with gasket without external reset button
D	NEMA Type 12 with external reset button
J	NEMA Type 12 without external reset button

Bulletin 2112 Full Voltage Non-Reversing Starter Units with Fusible Disconnect Switch (FVNR)

See page 61 for product description.

Table 34 -

NEMA Size	Horsepower				Fuse Clip (See Appendix for short circuit withstand ratings.)		Space Factor	Catalog Number (5) Wiring Type B—Class		Delivery Program
	208V	240V	380… 415V	480V/600V	Rating (Amperes)	Class		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
1 (1)	0.125…5	0.125…5	0.125…10	0.125…10	30	CC, J, HRCII-C	0.5	2112B-ZA_-___	2112B-ZD_-___	SC
1	0.125…7.5	0.125…7.5	0.125…10	0.125…10	30	CC, J, R, H, HRCII-C,	1.0	2112B-BA_-___	2112B-BD_-___	
					60	J, R, H, HRCII-C				
2	10	10…15	15…25	15…25	30 (3) 60 100	J, R, H, HRCII-C J, R, H, HRCII-C J, HRCII-C	1.0	2112B-CA_-___	2112B-CD_-___	
					100	R, H	1.5			
3	15…25	20…30	30…50	30…50	60 (3) 100 200	J J J	2.0	2112B-DA_-___	2112B-DD_-___	
					60 (3) 100 200	R, H, HRCII-C R, H, HRCII-C R, H, HRCII-C	2.5			
4	30…40	40…50	60…75	60…100	100 (3) 200 400	J, HRCII-C J, HRCII-C J	2.5	2112B-EA_-___	2112B-ED_-___	
					100 (3) 200	R, H R, H	3.0			
5	50…75	60…100	100…150	125…200	200 (3) 400 600	J J J	3.5	2112B-FA_-___	2112B-FD_-___	
					200 (3) 400	R, H, HRCII-C R, H, HRCII-C	4.0			
6 (2)	100…150	125…200	200…300	250…400	400 (3) 600 800	R, H J, R, HRCII-C L	6.0 (4) 25″ W	2112BB-GA_-___	2112BB-GD_-___	PE-II
					400 (3) 600 800	R, H J, R, HRCII-C L		2112BT-GA_-___	2112BT-GD_-___	

(1) Separate or transformer control only, except 208V (where separate control only). These units have horizontal operating handles, Bulletin 194R fused disconnect switch, up to four Bulletin 800F pilot devices and one 10-pt. pull-apart control terminal block (Type B-D only in Type B units), with #16 AWG control wire only. See page 27 for information on installation into series E-J sections.

(2) For NEMA size 6, select either top cable entry (2112BT-) or bottom cable entry (2112BB-).

(3) Available on 480V and 600V applications only.

(4) Frame mounted unit, section does not have vertical wireway.

(5) The catalog numbers listed are not complete:

- Select control voltage type from table on page 313 (for example, 2112B-BA**BD**).
- Select horsepower from table on page 314 (for example, 2112B-BABD-**31**).
- If power fuse is NOT selected, select fuse clip from table above. Then select clip designator from table on page 316 (for example,, 2112B-BABD-31-**24J**).
- If power fuse is selected, first select clip designator from table on page 316 (for example, 2112B-BABD-31__-**20J**). Then select power fuse from table on page 316 (for example, 2112B-BABD-31**GT**-20J).
- For fuse rating based on load horsepower, see publication 2100-TD003.

IMPORTANT The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers without the external reset button, replace the letter 'A' with the letter 'K' (for example, 2112B-BK_-___) or replace the letter 'D' with the letter 'J' (for example, 2112B-BJ_-____).

Bulletin 2112 Vacuum Full Voltage Non-Reversing Starter Unit with Vacuum Contactor and Fusible Disconnect Switch (FVNR)

- See page 61 for product description.
- Starters are supplied with one normally open and one normally closed auxiliary contacts as standard.
  Important: option code 91 is required to indicate the normally closed contact is being supplied.
  Additional auxiliary contacts (two normally open and two normally closed) can be added (option code 90011)
  With optional auxiliary contacts, the complete option code (including the standard normally closed contact) is 900111.
  Refer to Options section on page 151.

Table 35 -

Rating (Amperes)	Horsepower					Space Factor	Disconnect Switch Rating (Amperes)	Fuse Clip (See Appendix for short circuit withstand ratings.)		Catalog Number (3) Wiring Type B—Class		Delivery Program
	208V	240V	380 … 415V	480V	600V			Rating (Amperes)	Fuse Class	NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
200	40…50	40…60	60…100	60…125	60…150	3.5	200	100(2)	J, R, H, HRCII-C	2112B-VBA_-___	2112B-VBD_-___	ENG
								200	J, R, H, HRCII-C			
								400	J			
	60	75	-	150	200	4	400	200(2)	J, R, H, HRCII-C			
								400	J			
400	75	100	125…150	200	250	4.5	400	200(2)	J, R, H, HRCII-C	2112B-VCA_-___	2112B-VCD_-___	
								400	J, R, H, HRCII-C			
								600	J			
	100…125	125…150	200…250	250…300	300…400	6.0 20″W(1)	600	400	J, R, H, HRCII-C			ENG
								600	J			
600	150	-	300	350	-	6.0 20″W(1)	600	400	J, R, H, HRCII-C	2112B-VDA_-___	2112B-VDD_-___	
								600	J			

(1) Frame mounted unit, section does not have vertical wireway.
(2) Available on 480 and 600 Volt applications only.
(3) The catalog numbers listed are not complete:
Select the control voltage type from table on page 313 (for example, 2112B-VBA**BD**).
Select the horsepower from table on page 314 (for example, 2112B-VBABD-**51**).
If power fuse is NOT selected, select fuse clip from table above. Then select clip designator from table on page 316 (for example, 2112B-VBABD-51-**26J**).
If power fuse is selected, first select clip designator from table on page 316 (for example, 2112B-VBABD-51__-**20J**).
Then select power fuse from table on page 316 (for example, 2112B-VBABD-51**GT**-20J).
For fuse rating based on load horsepower, see publication 2100-TD003.

IMPORTANT The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers without the external reset button, replace the letter 'A' with the letter 'K' (for example, 2112B-VBK_-___) or replace the letter 'D' with the letter 'J' (for example, 2112B-VBJ_-_).

Bulletin 2113 Full Voltage Non-Reversing Starter Unit with Circuit Breaker (FVNR)

- See page 61 for product description.
- Includes line terminal guards for circuit breakers on all units.

Table 36 -

NEMA Size	Horsepower				Space Factor	Catalog Number [8] Wiring Type B—Class I		Delivery Program
	208V	240V	380…415V	480V/600V		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
1 [1]	0.125…3	0.125…5	0.125…7.5	0.125…10	0.5	2113B-ZA_-___	2113B-ZD_-___	SC
1	0.125…7.5	0.125…7.5	0.125…10	0.125…10	1.0	2113B-BA_-___	2113B-BD_-___	
DUAL 1 [2]	0.125…7.5	0.125…7.5	0.125…10	0.125…10	1.5	2113B-BA_-___ [9]	2113B-BD_-___ [9]	
2	10	10…15	15…25[5]	15…25	1.0	2113B-CA_-___	2113B-CD_-___	
3	15…25[4]	20…30[4]	30…50[4]	---	2.0	2113B-DA_-___	2113B-DD_-___	
	---	---	---	30…50	1.5			
4	30…40	40…50	60…75	---	2.5	2113B-EA_-___	2113B-ED_-___	
	---	---	---	60…100	2.0			
5	50…75	60…100	100…150	125…200	3.5	2113B-FA_-___	2113B-FD_-___	
6 [3]	100…150	125…200	200…300[6]	250…400	6.0 [7] 25″ W	2113BT-GA_-___	2113BT-GD_-___	PE-II
						2113BB-GA_-___	2113BB-GD_-___	

(1) Separate or transformer control only, except 208V (where separate control only). These units have horizontal operating handles, up to four Bulletin 800F pilot devices and one 10-pt. pull-apart control terminal block (Type BD only in Type B units), with #16 AWG control wire only. See page 27 for information on installation into series E-J sections.

(2) Dual mounted units supplied without power terminal blocks.

(3) For 200 HP at 240V or 400 HP at 480V, suffix letter identifying circuit breaker must be **TMM** only. For NEMA size 6, select either top cable entry (2113B**T**-) or bottom entry (2113B**B**-) of motor load cables.

(4) 25 HP at these voltage ratings are not UL listed. Per US NEC, if unit is installed in the USA it must use an Inverse Time (Thermal Magnetic or Electronic) breaker; MCP breaker are non-compliant with US NEC for these units.

(5) 50 HP at these voltage ratings are not UL listed. Per US NEC, if unit is installed in the USA it must use an Inverse Time (Thermal Magnetic or Electronic) breaker; MCP breaker are non-compliant with US NEC for these units.

(6) 300 HP at these voltage ratings are not UL listed. Per US NEC, if unit is installed in the USA it must use an Inverse Time (Thermal Magnetic or Electronic) breaker; MCP breaker are non-compliant with US NEC for these units.

(7) Frame mounted unit, section does not have vertical wireway.

(8) The catalog numbers listed are not complete:
- Select the control voltage type from table on page 313 (for example, 2113B-BA**BD**).
- Select horsepower from table on page 314 (for example,2113B-BABD-**30**).
- Select circuit breaker from Circuit Breaker Type table on page 320 (for example, 2113B-BABD-30**TGA**).
- For circuit breaker size based on load horsepower, refer to publication 2100-TD032.

(9) Dual mounting of combination starters in one unit. Add two numbers from table on page 314 to identify the horsepower and add the suffix letter from table on page 320 to identify the circuit breaker type (for example, 2113B-BABD-**3941TGA**).

IMPORTANT The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers without the external reset button, replace the letter 'A' with the letter 'K' (for example, 2113B-BK_-___) or replace the letter 'D' with the letter 'J' (for example, 2113B-BJ_-____).

Bulletin 2113 Vacuum Full Voltage Non-Reversing Starter Unit with Vacuum Contactor and Circuit Breaker (FVNR)

- See page 61 for product description.
- Starters are supplied with one normally open and one normally closed auxiliary contacts as standard.
  Important: option code 91 is required to indicate the normally closed contact is being supplied.
  Additional auxiliary contacts (two normally open and two normally closed) can be added (option code 90011)
  With optional auxiliary contacts, the complete option code (including the standard normally closed contact) is 900111.
  Refer to Options section on page 151.

Table 37 -

Rating (Amperes)	Horsepower					Space Factor	Circuit Breaker Frame (Amperes)	Catalog Number (2) Wiring Type B—Class		Delivery Program
	208V	240V	380V	480V	600V			NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
200	40	40…50	60…75	60…100	60…100	3.5	250AF	2113B-VBA_-__	2113B-VBD_-__	ENG
	50	60	-	125	125…150	3.5	400AF	2113B-VBA_-__	2113B-VBD_-__	
400	60…75	75…100	100…150	125…200	200	3.5	400AF	2113B-VCA_-__	2113B-VCD_-__	
	-	-	-	-	250	4	800AF	2113B-VCA_-__	2113B-VCD_-__	
	100…125	125…150	200	250…300	300…400	6.0, 20”W(1)	800AF	2113B-VCA_-__	2113B-VCD_-__	
600	150	-	250	350	-	6.0, 20”W(1)	800AF	2113B-VDA_-_	2113B-VDD_-_	

(1) Frame mounted unit, section does not have vertical wireway.

(2) The catalog numbers listed are not complete:
- Select the control voltage type from table on page 313 (for example, 2113B-VBA**BD**).
- Select the horsepower from table on page 314 (for example, 2113B-VBABD-**52**).
- Select the circuit breaker from Circuit Breaker Type table on page 320 (for example, 2113B-VBABD-52**TJM**).
- For circuit breaker size based on load horsepower, refer to publication 2100-TD032.

IMPORTANT The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers without the external reset button, replace the letter ‘A’ with the letter ‘K’ (for example, 2113B-VBK_-__) or replace the letter ‘D’ with the letter ‘J’ (for example, 2113B-VBJ_-____).

Bulletin 2112 and 2113 Space Saving NEMA Combination Full Voltage Non-Reversing Starter Units (FVNR)

These combination full voltage non-reversing starter units offer a space saving alternative while utilizing an Allen-Bradley Bulletin 300 starter and either a fused disconnect or a circuit breaker. The Bulletin 2112 Space Saving NEMA non-reversing starter units are rated for NEMA Size 1 applications and the Bulletin 2113 Space Saving NEMA non-reversing starter units are rated for NEMA Size 1…4 applications. Each unit is provided as a NEMA Class I, Type B-D unit with terminals mounted in the unit for connections to remote devices. These full voltage non-reversing units are available with electronic overload relays.

Catalog Number Explanation - Space Saving NEMA Bulletin 2112 and 2113 Full Voltage Non-Reversing Starters (FVNR)

- Allen-Bradley Bulletin 300 starter with fused disconnect or circuit breaker
- NEMA Class 1, Type B unit with terminals mounted in unit
- Available with electronic overload relay
- Space saving alternative to traditional NEMA starter units

Table 38 -

2112	**B**	-	**3B**	**A**	**B**	-	**38-24J**	-	**
2113	**B**	-	**3B**	**A**	**B**	-	**38TGA**	-	**
Bulletin Number	Wiring Type		NEMA Size	NEMA Enclosure Type	Control Voltage Type		Horsepower and Disconnecting Means		Option

Code	Type
2112	Full Voltage Non-Reversing (FVNR) with Fused Disconnect
2113	Full Voltage Non-Reversing (FVNR) with Circuit Breaker

Code	Wiring Type
B	Type B-D

Code	NEMA Size
3B	1
3C	2
3D	3
3E	4

Code	NEMA Enclosure Type
A	NEMA Type 1 or Type 1 with gasket with external reset button
K	NEMA Type 1 or Type 1 with gasket without external reset button
D	NEMA Type 12 with external reset button
J	NEMA Type 12 without external reset button

Code	Control Voltage Type
See Table on page 313.	

Code	Horsepower Code and Disconnecting Means
2112 - '38-24J'	'38' Horsepower Code. See table on page 314. '24J' Fuse Clip Rating and Class. See table on page 316.
2113 - '38TGA'	'38_' Horsepower Code. See table on page 314. '_TGA' Circuit Breaker Type. See table on page 320.

Code	Option
See Options section beginning on page 171.	

Bulletin 2112 Space Saving NEMA Full Voltage Non-Reversing Starter Unit with Fused Disconnect Switch (FVNR)

- See page 67 for product description.
- Units are cULus listed unless otherwise indicated.

Table 39 -

NEMA Size	Horsepower		Fuse Clip (See Appendix for short circuit withstand ratings.)		Space Factor	Catalog Number (2) Wiring Type B—Class I		Delivery Program
	480V	600V	Rating (Amperes)	Class		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
1	0.5…10	0.75…10	30	CC, J, HRCII-C	0.5(1)	2112B-3BA_-___	2112B-3BD_-___	SC

(1) These units have horizontal operating handles, Bulletin 194R fused disconnect, up to four Bulletin 800F pilot devices, #16 AWG control wire and one 10-point control terminal block (Type B-D only in Type B units). See page 27 for information on installation into series E-J sections.

(2) The catalog numbers listed are not complete:
- Select control voltage type from table on page 313 (for example, 2112B-3BA**BD**).
- Select horsepower from table on page 314 (for example, 2112B-3BABD-**38**).
- Select fuse class from above. Then select clip designator from table on page 316 (for example, 2112B-3BABD-38-**24J**).

IMPORTANT The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers without the external reset button, substitute the letter 'A' with the letter 'K' (for example, 2112B-3BK_-_) or replace the letter 'D' with the letter 'J' (for example, 2112B-3BJ_-_).

Bulletin 2113 Space Saving NEMA Full Voltage Non-Reversing Starter Unit with Circuit Breaker (FVNR)

- See page 67 for product description.
- Units are cULus listed unless otherwise indicated.

Table 40 -

NEMA Size	Horsepower		Space Factor	Catalog Number (3) Wiring Type B—Class I		Delivery Program
	480V	600V		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
1	0.5…10	0.75…10	0.5(1)	2113B-3BA_-___	2113B-3BD_-___	SC
2	15…25	15…25	0.5(1)	2113B-3CA_-___	2113B-3CD_-___	
3	30…50	30…50	1.0(1)	2113B-3DA_-___	2113B-3DD_-___	
4	60…100	60…100	1.0(1),(2)	2113B-3EA_-___	2113B-3ED_-___	

(1) These units have horizontal operating handles, up to four Bulletin 800F pilot devices, #16AWG control wire and one 10-point control terminal block (Type B-D only in Type B units). See page 27 for information on installation into series E-J sections.

(2) 1.0 space factor for unit with E1 Plus overload relay (option 7FEE_, 7FEE_D, or 7FEE_J)
1.5 space factor for unit with E3 overload relay (option 7FEC1_ or 7FEC2_)

(3) The catalog numbers listed are not complete:
- Select control voltage type from table on page 313 (for example, 2113B-3BA**BD**).
- Select horsepower from table on page 314 (for example, 2113B-3BABD-**38**).
- Select circuit breaker type from Circuit Breaker Type table on page 320 (for example, 2113B-3BABD-38**TGA**).

IMPORTANT The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers without the external reset button, substitute the letter 'A' with the letter 'K' (for example, 2113B-3BK_-_) or replace the letter 'D' with the letter 'J' (for example, 2113B-3BJ_-_).

Bulletin 2122E, 2123E, 2122F and 2123F Combination 2-speed Starter Units (TS2W and TS1W)

These combination 2-speed starter units are supplied with an Allen-Bradley Bulletin 520 starter and either a fusible disconnect or a circuit breaker. The 2122 and 2123 starter units are designed for use with motors having separate windings or consequent pole windings. The 2122E, 2123E, 2122F, and 2123F are rated for NEMA sizes 1…5. Each unit is provided as a NEMA Class I, Type B-T unit, with terminals mounted in the unit for connection of remote devices. The 2-speed starter units are available with a eutectic alloy or E1 Plus overload relay.

Catalog Number Explanation - Bulletin 2122E, 2123E, 2122F and 2123F Combination 2-speed Starter Units (TS2W and TS1W)

- Allen-Bradley Bulletin 520 starter with a fusible disconnect or circuit breaker
- Designed with separate windings or consequent pole windings
- NEMA Class I, Type B wiring with terminals mounted in the unit
- 2-speed units available with eutectic alloy or E1 Plus overload relays
- NEMA Sizes 1…5

Table 41 -

2122E / 2123F	B	-	B	A	B	-	41-24J / 41TGA	-	6P / 6P
Bulletin Number	Wiring Type		NEMA Size	NEMA Enclosure Type	Control Voltage Type		Horsepower and Disconnecting Means		Option

Code	Type
2122E	2-speed, 2-Winding Starter (TS2W) with Fusible Disconnect
2123E	2-speed, 2-Winding (TS2W) with Circuit Breaker
2122F	2-speed, 1-winding Starter (TS1W) with Fusible Disconnect
2123F	2-speed, 1-winding (TS1W) with Circuit Breaker

Code	Wiring Type
A	Type A
B	Type B

Code	NEMA Size
B	1
C	2
D	3
E	4
F	5

Code	NEMA Enclosure Type
A	NEMA Type 1 or Type 1 with gasket with external reset button
K	NEMA Type 1 or Type 1 with gasket without external reset button
D	NEMA Type 12 with external reset button
J	NEMA Type 12 without external reset button

Code	Control Voltage Type
See table on Page 313.	

Code	Fuse Clip Ratings and Class or Trip Current Circuit Breaker Type
2122 - '41-24J'	'41' Horsepower Code. See table on Page 314 '24J' Fuse Clip Rating and Class. See Fuse Clip Designator table on page 316
2123 - '41TGA'	Horsepower Code. See table on page 314 '_TGA' Circuit Breaker Type. See Circuit Breaker Type table on page 320.

Code	Option
See Options section beginning on Page 145.	

Bulletin 2122E 2-speed, 2-winding Starter Unit with Fusible Disconnect Switch (TS2W)

- See page 69 for product description.
- Basic configuration includes one set of 3-pole fuse clips.

IMPORTANT A 2-speed, 2-winding motor (TS2W) requires a mechanically and electrically interlocked assembly of two 3-pole contactors. A 2-speed, 1-winding motor (TS1W) requires a mechanically and electrically interlocked assembly of 3-pole and 5-pole contactors. Consult your local Allen-Bradley distributor or Rockwell Automation sales representative for application assistance.

Table 42 -

NEMA Size	Constant or Variable Torque Horsepower				Fuse Clip (See Appendix for short circuit withstand ratings.)		Space Factor	Catalog Number (4) Wiring Type B—Class I		Delivery Program
	208V	240V	380…415V	480V/600V	Rating (Amperes)	Class		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
1	0.125…7.5	0.125… 7.5	0.125…10	0.125…10	30	CC, J, R, H, HRCII-C	2.0	2122EB-BA_-___	2122EB-BD_-___	SC
					60	J, R, H, HRCII-C				
2	10	10…15	15…25	15…25	30 (2) 60 100	J, R, H, HRCII-C J, R, H, HRCII-C J, R, H, HRCII-C	2.0	2122EB-CA_-___	2122EB-CD_-___	
3	15-25	20…30	30…50	30…50	60 (2) 100 200	J, R, H, HRCII-C J, R, H, HRCII-C J, R, H, HRCII-C	3.0	2122EB-DA_-___	2122EB-DD_-___	
4	30-40	40…50	60…75	60…100	100 (2) 200 400	J, R, H, HRCII-C J, R, H, HRCII-C J	4.5	2122EB-EA_-___	2122EB-ED_-___	PE
5 (1)	50-75	60…100	100…150	125…200	200 (2) 400 600	J, R, H, HRCII-C J, R, H, HRCII-C J	6.0 (3), 20″ W	2122EB-FA_-___	2122EB-FD_-___	PE-II

(1) If low speed full load current is below 77 A, a special starter is required. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

(2) Available on 480V and 600V applications only.

(3) Frame mounted unit, section does not have vertical wireway.

(4) The catalog numbers listed are not complete:

- Select the control voltage type from table on page 313 (for example, 2122EB-BA**BD**).
- Select horsepower from table on page 314 (for example, 2122EB-BABD-**31**).
- If power fuse is NOT selected, select fuse clip from table above. Then select clip designator from table on page 316 (for example, 2122EB-BABD-31-**24J**).
- If power fuse is selected, first select clip designator from table on page 316 (for example, 2122EB-BABD-31___-**20J**). Then select power fuse from table on page 316 (for example, 2122EB-BABD-31**GT**-20J).
- For fuse rating based on load horsepower, see publication 2100-TD003.

IMPORTANT The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers without the external reset button, replace the letter 'A' with the letter 'K' (for example, 2122EB-BK_-___) or replace the letter 'D' with the letter 'J' (for example, 2122EB-BJ_-____).

Bulletin 2122F 2-speed, 1-winding Starter Unit with Fusible Disconnect Switch (TS1W)

- See page 69 for product description.
- Basic configuration includes one set of 3-pole fuse clips.

IMPORTANT A 2-speed, 1-winding motor (TS1W) requires a mechanically and electrically interlocked assembly of 3-pole and 5-pole contactors. A 2-speed, 2-winding motor (TS2W) requires a mechanically and electrically interlocked assembly of two 3-pole contactors. Consult your local Allen-Bradley distributor or Rockwell Automation sales representative for application assistance.

Table 43 -

NEMA Size	Constant or Variable Torque Horsepower				Fuse Clip (See Appendix for short circuit withstand ratings.)		Space Factor	Catalog Number (4) Wiring Type B—Class I		Delivery Program
	208V	240V	380…415V	480V/600V	Rating (Amperes)	Class		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
1	0.125…7.5	0.125…7.5	0.125…10	0.125…10	30	CC, J, R, H, HRCII-C	2.0	2122FB-BA_-___	2122FB-BD_-___	SC
					60	J, R, H, HRCII-C				
2	10	10…15	15…25	15…25	30 (2) 60 100	J, R, H, HRCII-C J, R, H, HRCII-C J, R, H, HRCII-C	2.0	2122FB-CA_-___	2122FB-CD_-___	
3	15…25	20…30	30…50	30…50	60 (2) 100 200	J, R, H, HRCII-C J, R, H, HRCII-C J, R, H, HRCII-C	4.0	2122FB-DA_-___	2122FB-DD_-___	
4	30…40	40…50	60…75	60…100	100 (2) 200 400	J, R, H, HRCII-C J, R, H, HRCII-C J	4.5	2122FB-EA_-___	2122FB-ED_-___	PE
5 (1)	50…75	60…100	100…150	125…200	200 (2) 400 600	J, R, H, HRCII-C J, R, H, HRCII-C J	6.0 (3) 25” W	2122FB-FA_-___	2122FB-FD_-___	PE-II

(1) If low speed full load current is below 77 A, a special starter is required. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

(2) Available on 480V and 600V applications only.

(3) Frame mounted unit, section does not have vertical wireway.

(4) The catalog numbers listed are not complete:

- Select the control voltage type from table on page 313 (for example, 2122FB-BA**BD**).
- Select the horsepower from table on page 314 (for example, 2122FB-BABD-**31**).
- If power fuse is NOT selected, select fuse clip from table above. Then select clip designator from table on page 316 (for example, 2122FB-BABD-31-**24J**).
- If power fuse is selected, first select clip designator from table on page 316 (for example, 2122FB-BABD-31___-**20J**). Then select power fuse from table on page 316 (for example, 2122FB-BABD-31**GT**-20J).
- For fuse rating based on load horsepower, see publication 2100-TD003.

IMPORTANT The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers without the external reset button, replace the letter ‘A’ with the letter ‘K’ (for example, 2122FB-BK_-___) or replace the letter ‘D’ with the letter ‘J’ (for example, 2122FB-BJ_-____).

Bulletin 2123E 2-speed, 2-Winding Starter Unit with Circuit Breaker (TS2W)

- See page 69 for product description.
- Includes line terminal guards on circuit breakers for all units.

IMPORTANT A 2-speed, 2-winding motor (TS2W) requires a mechanically and electrically interlocked assembly of two 3-pole contactors. A 2-speed, 1-winding motor (TS1W) requires a mechanically and electrically interlocked assembly of 3-pole and 5-pole contactors. Consult your local Allen-Bradley distributor or Rockwell Automation sales representative for application assistance.

Table 44 -

NEMA Size	Constant or Variable Torque Horsepower				Space Factor	Catalog Number (3) Wiring Type B—Class I		Delivery Program
	208V	240V	380…415V	480V/600V		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
1	0.125…7.5	0.125…7.5	0.125…10	0.125…10	2.0	2123EB-BA_-___	2123EB-BD_-___	SC
2	10	10…15	15…25	15…25	2.0	2123EB-CA_-___	2123EB-CD_-___	
3	15…25	20…30	30…50	30…50	3.0	2123EB-DA_-___	2123EB-DD_-___	
4	30…40	40…50	60…75	60…100	4.5	2123EB-EA_-___	2123EB-ED_-___	PE
5 (1)	50…75	60…100	100…150	125…200	6.0 (2), 20″ W	2123EB-FA_-___	2123EB-FD_-___	PE-II

(1) If low speed full load current is below 77 A, a special starter is required. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.
(2) Frame mounted unit, section does not have vertical wireway.
(3) The catalog numbers listed are not complete:
- Select the control voltage type from table on page 313 (for example, 2123EB-BA**BD**).
- Select the horsepower from table on page 314 (for example, 2123EB-BABD-**30**).
- Select the circuit breaker from Circuit Breaker Type table on page 320 (for example, 2123EB-BABD-30**TGA**).
- For circuit breaker size based on load horsepower, refer to publication 2100-TD032.

IMPORTANT The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers without the external reset button, replace the letter 'A' with the letter 'K' (for example, 2123EB-BK_-___) or replace the letter 'D' with the letter 'J' (for example, 2123EB-BJ_-____).

Bulletin 2123F 2-speed, 1-winding Starter Unit with Circuit Breaker (TS1W)

- See page 69 for product description.
- Includes line terminal guards on circuit breakers for all units.

IMPORTANT A 2-speed, 1-winding motor (TS1W) requires a mechanically and electrically interlocked assembly of 3-pole and 5-pole contactors. A 2-speed 2-winding motor (TS2W) requires a mechanically and electrically interlocked assembly of two 3-pole contactors. Consult your local Allen-Bradley distributor or Rockwell Automation sales representative for application assistance.

Table 45 -

NEMA Size	Constant or Variable Torque Horsepower				Space Factor	Catalog Number (3) Wiring Type B—Class I		Delivery Program
	208V	240V	380…415V	480V/600V		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
1	0.125…7.5	0.125…7.5	0.125…10	0.125…10	2.0	2123FB-BA_-___	2123FB-BD_-___	SC
2	10	10…15	15…25	15…25	2.0	2123FB-CA_-___	2123FB-CD_-___	
3	15…25	20…30	30…50	30…50	3.5	2123FB-DA_-___	2123FB-DD_-___	
4	30…40	40…50	60…75	60…100	4.5	2123FB-EA_-___	2123FB-ED_-___	PE
5 (1)	50…75	60…100	100…150	125…200	6.0 (2) 25″ W	2123FB-FA_-___	2123FB-FD_-___	PE-II

(1) If low speed full load current is below 77 A, a special starter is required. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.
(2) Frame mounted unit, section does not have vertical wireway.
(3) The catalog numbers listed are not complete:
- Select the control voltage type from table on page 313 (for example, 2123FB-BA**BD**).
- Select the horsepower from table on page 314 (for example, 2123FB-BABD-**30**).
- Select the circuit breaker from Circuit Breaker Type table on page 320 (for example, 2123FB-BABD-30**TGA**).
- For circuit breaker size based on load horsepower, refer to publication 2100-TD032.

IMPORTANT The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers without the external reset button, replace the letter 'A' with the letter 'K' (for example, 2123FB-BK_-___) or replace the letter 'D' with the letter 'J' (for example, 2123FB-BJ_-____).

Notes:

Chapter 6

Metering Units

Bulletin 2190 - Metering Compartments (METER)

Bulletin 2190 metering compartments are used for power management of three-phase systems and include analog ammeter and voltmeter, and PowerMonitor™ 5000 unit. The PowerMoniter 5000 unit includes a 30 A fused disconnect switch.

- Ammeter:

  Panel type (not switchboard type) with 5 A movement, 3.5" scale, 102° deflection, and 2% of full scale accuracy.
- Voltmeter:

  Phase-to-phase voltage measurement only. Panel type (not switchboard type) with 120V movement, 3.5" scale, 102° deflection, and 2% of full scale accuracy.
- PowerMonitor 5000, Bulletin 1426-M5:

  1426-DM is a PanelView Component C400 terminal with factory-installed applications. The power monitor can display 64 real-time parameters, including current (I_a, I_b, I_c, I_n, I_3) $_{avg}$, ±0.2% full-scale accuracy, voltage (V_{an}, V_{bn}, V_{cn}, V_{ab}, V_{bc}, V_{ca} ±0.2% full-scale accuracy), current, and voltage imbalance. There are four forms of power (real, reactive, apparent, and true, ±0.4% full-scale accuracy), kWh, KVARh, $kVAH_{net,}$ true RMS to the 63^{th} harmonic, frequency (±0.05%), and power factor (±0.4%). The PowerMonitor 5000 unit includes min./max, event logs, trend log (up to 45,867 data points), and distortion analysis with THD, crest factor (I, V), and distortion power factor. Every PowerMonitor 5000 unit includes Ethernet network communication as standard and has options for DeviceNet and ControlNet network communication. The 1426-M5 unit can be flash upgraded to M6, and M8 PowerMonitor 5000 units. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative for details.
- PowerMonitor 5000, Bulletin 1426-M6:

  Same functionality as the Bulletin 1426-M5 except for the addition of harmonic analysis with TIF, Crest Factor, IEEE 519, and % THD and multiple channel and cycle oscillographic recordings. In addition, the same communication platforms are available.

Catalog Number Explanation - Bulletin 2190

- Analog Voltmeter and/or Ammeter or Digital Metering System
- Current Transformers (CTs) shipped loose for field mounting
- Potential transformers (PTs) included as needed
- Field mountable in 0.5, 1.0, or 1.5 space factor location
- Control Transformers included as needed

Table 46 -

2190	-	B	K	B	-	54M	-	86UCCXB	-	**
Bulletin Number		Space Factor	Enclosure Type	Line Voltage		Ammeter Scale		Meter Designation		Options

Code	Type
2190	Metering Unit (METER)

Code	Space Factor
A	0.5 Space Factor
B	1.0 Space Factor

Code	Enclose Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Line Voltage
H	208V
P	220…230V
A	240V
N	380V
KN	400V
I	415V
B	480V
C	600V

Code	Ammeter Scale
48M	300 A
50M	400 A
52M	600 A
54M	800 A
56M	1200 A
58M	1600 A
60M	2000 A

Code	Options
See Options section beginning on Page 145.	

Code	Meter Designation
85AAXX	Analog ammeter
85BBXX	Analog ammeter with ammeter switch (2 CTs)
85BCXX	Analog ammeter with ammeter switch (3 CTs)
85EBB_	Analog ammeter and voltmeter with switches (2 CTs)
85ECB_	Analog ammeter and voltmeter with switches (3 CTs)
86W5__X_	Bulletin 1426-M5 PowerMonitor 5000
86W6__X_	Bulletin 1426-M6 PowerMonitor 5000
86W8__X_	Bulletin 1426-M8 PowerMonitor 5000

Table 47 - Analog Metering Compartments

Meter Type	Description		Line Voltage (Volts)	Space Factor	Catalog Number (1) Wiring Type A Only—Class I		Delivery Program
					NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
Analog Ammeter	One current transformer and panel type ammeter.	Current transformers shipped loose with hardware and mounting instructions. Metering mounted in door, no disconnect means, no unit insert.	600 Max.	0.5	2190-AKC-___-85AAXX	2190-AJC-___-85AAXX	SC
				1.0	2190-BKC-___-85AAXX	2190-BJC-___-85AAXX	
Analog Ammeter with Ammeter Switch	Two current transformers, panel type ammeter, and ammeter switch. Use on 3-phase, 3-wire systems only.			0.5	2190-AKC-___-85BBXX	2190-AJC-___-85BBXX	
				1.0	2190-BKC-___-85BBXX	2190-BJC-___-85BBXX	
	Three current transformers, panel type ammeter, and ammeter switch. Use on 3-phase, 3-wire systems only.			0.5	2190-AKC-___-85BCXX	2190-AJC-___-85BCXX	
				1.0	2190-BKC-___-85BCXX	2190-BJC-___-85BCXX	
Analog Ammeter and Voltmeter with Switches	Two current transformers, panel type ammeter with ammeter switch, two fused potential transformers, and panel type Voltmeter with Voltmeter switch. Use on 3-phase, 3-wire systems only.	Plug-in metering units with disconnect and fuses. Current transformers shipped loose with hardware and mounting instructions.	208	1.0	2190-BKH-___-85EBBH	2190-BJH-___-85EBBH	
			220/230		2190-BKP-___-85EBBP	2190-BJP-___-85EBBP	
			240		2190-BKA-___-85EBBA	2190-BJA-___-85EBBA	
			380		2190-BKN-___-85EBBN	2190-BJN-___-85EBBN	
			400		2190-BKKN-___-85EBBKN	2190-BJKN-___-85EBBKN	
			415		2190-BKI-___-85EBBI	2190-BJI-___-85EBBI	
			480		2190-BKB-___-85EBBB	2190-BJB-___-85EBBB	
			600		2190-BKC-___-85EBBC	2190-BJC-___-85EBBC	
	Three current transformers, panel type ammeter with ammeter switch, two fused potential transformers, and panel type Voltmeter with Voltmeter switch. Use on 3-phase, 3-wire systems only.		208	1.0	2190-BKH-___-85ECBH	2190-BJH-___-85ECBH	
			220/230		2190-BKP-___-85ECBP	2190-BJP-___-85ECBP	
			240		2190-BKA-___-85ECBA	2190-BJA-___-85ECBA	
			380		2190-BKN-___-85ECBN	2190-BJN-___-85ECBN	
			400		2190-BKKN-___-85ECBKN	2190-BJKN-___-85ECBKN	
			415		2190-BKI-___-85ECBI	2190-BJI-___-85ECBI	
			480		2190-BKB-___-85ECBB	2190-BJB-___-85ECBB	
			600		2190-BKC-___-85ECBC	2190-BJC-___-85ECBC	

(1) The catalog numbers listed are not complete. Select the appropriate catalog string number from table on page 78 to identify the ammeter scale and current transformer primary ratio (for example, 2190-AKC-**52M**-85AAXX).

Table 48 - Digital Metering Compartments

Meter Type	Description	Space Factor	Catalog Number (1) Wiring Type A Only—Class I		Delivery Program
			NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
Bulletin 1426-M5 PowerMonitor 5000 with EtherNet/IP Communication	Plug-in unit with disconnect, fuses, and control circuit transformer. For 3-phase, 3-wire systems, three current transformers are shipped loose with hardware and mounting instructions. For 3-phase, 4-wire systems, four current transformers are shipped loose with hardware and mounting instructions.	1.5	2190-CK_-_-86W5_ _X_	2190-CJ_-_-86W5_ _X_	SC
Bulletin 1426-M6 PowerMonitor 5000 with EtherNet/IP Communication			2190-CK_-_-86W6_ _X_	2190-CJ_-_-86W6_ _X_	PE
Bulletin 1426-M8 PowerMonitor 5000 with EtherNet/IP Communication			2190-CK_-_-86W8_ _X_	2190-CJ_-_-86W8_ _X_	PE

(1) The catalog numbers listed are not complete:

- Select the appropriate voltage code from Line Voltage table to identify the line voltage code. The voltage code must be in two places in the catalog string (for example, 2190-BK**B**-54M-86W50CX**B**).
- Select the appropriate catalog string number from Ammeter Scales table to identify the current transformer primary ratio (for example, 2190-BKB-**54M**-86W50CXB).
- For PowerMonitor 5000 units, select the appropriate letter from the PowerMonitor 5000 Communication Options table to identify the communication platform (for example, 2190-BKB-54M-86W5**4**CXB).
- The wiring system is determined in the system settings for Assembled MCC Orders and must be selected for Unassembled MCC Orders. For Unassembled MCC Orders, select the appropriate letter from System Wiring table to identify the system wiring (for example, 2190-BKB-54M-86W50**C**XB.)

Table 49 - Line Voltage

Line Voltage	Voltage Code
208	H
240	A
380	N
400	KN
415	I
480	B
600	C

Table 50 - Ammeter Scales

Ammeter Scale	Catalog String
300 A	48M
400 A	50M
600 A	52M
800 A	54M
1200 A	56M
1600 A	58M
2000 A	60M

Table 51 - PowerMonitor 5000 Communication Options

Platform	Communication Code
Standard with Display	**0**
DeviceNet with Display[1]	**2**
Ethernet with Display	**4**

(1) These communication platforms are in addition to the native EtherNet/IP.

Table 52 - System Wiring[1]

System Wiring	Letter Code
3-phase, 3-wire, Wye, Solid Ground	C
3-phase, 4-wire, Wye, Solid Ground	D
3-phase, 3-wire, Delta, Ungrounded	E
3-phase, 3-wire, Wye, Impedance (HRG) Ground	F

(1) System Wiring is determined by the system setting. This option must match the system setting for the incoming power.

Notes:

Main and Feeder Units

Bulletin 2191F and 2191M Outgoing Feeder Lug Compartment (FLUG) and Incoming Main Lug Compartment (MLUG)

Bulletin 2191M and 2191F are line lug compartments that provide a lug connection for incoming lines (2191M) to distribute power to the motor control center or for outgoing cables (2191F) to feed power from the MCC to an external load. These line lug compartments are available with ratings from 300…2000 A. Optional mechanical or crimp lugs can be supplied with the lug compartments.

Catalog Number Explanation - Bulletin 2191F and 2191M Incoming and Outgoing Lug Compartment Units

- Line Lug Compartments
- Rated from 300…2000 A
- Mechanical or crimp lugs are available

Table 53 -

2191M	T	-	C	K	C	-	54	-	83D500-86UCCXB	-	**
Bulletin Number	Mounting		Space Factor	Enclosure Type	Line Voltage		Amperes		Lug and Meter Options		Options

Code	Type
2191F	Outgoing Feeder Lug Compartment (FLUG)
2191M	Incoming Main Lug Compartment (MLUG)

Code	Mounting
T	Top
B	Bottom

Code	Space Factor
A	0 (mounted in top horizontal wireway)
B	1.0
C	1.5
D	2.0
J	4.5 (71″ High Sections)
M	6.0
N	6.0 (Corner Section)
P	6.0 (10″ Wide Section)

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Line Voltage
C	Up to 600V

Code	Amperes
48	300 A
52	600 A
54	800 A
56	1200 A
58	1600 A
60	2000 A

Code	Lug and Meter Options
See tables on page 84.	

Code	Options
See Options section beginning on page 145.	

Bulletin 2191M and 2191F Lug Compartments—Provisions for Basic Sections/ Incoming Lines (MLUG) and Outgoing Feeders (FLUG)

- See page 81 for product description.
- All lugs compartments are frame mounted and must be located at top or bottom of section.
- Basic configuration includes door, unit support pan, lug pads, and hardware.
- Configure section and lugs separately.
- For 4-wire applications. Incoming neutral bus (see page 161) or neutral connection plates (see pages 35, 144, 162 and 326) are available for Bulletins 2191MT and 2191MB.
- For 71" high sections, see restrictions on page 32.
  2191FT—Top mounted feeder
  2191FB—Bottom mounted feeder
  2191MT—Top mounted main
  2191MB—Bottom mounted main
- Top- and bottom-mounted mains are designed with adequate space to route cables to lugs. Give special consideration to the mounting of the CTs for a metering device. Consider the addition of a pull box.
- Refer to Appendix for wire size conversion table.

Table 54 -

Rating (Amperes)	Cable Provisions Maximum Number Per Phase and Maximum Cable Size [5]			Space Factor	Catalog Number [13] Wiring Type A Only—Class I		Delivery Program
	Mechanical Type Lugs		Crimp Type Lugs		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
	Single Cable Lug	Multiple Cable Lug					
PROVISIONS FOR BASIC SECTIONS							
300[1]	(2) 400 kcmil	—	(2) 350 kcmil	1.0 [8],[6]	2191F_-BKC-48	2191F_-BJC-48	SC-II
				1.0 [8],[10]	2191M_-BKC-48	2191M_-BJC-48	
600[2]	(2) 400 kcmil	(4) 250 kcmil	(2) 350 kcmil	1.0 [7],[8]	2191F_-BKC-52	2191F_-BJC-52	
				1.0 [8]	2191M_-BKC-52	2191M_-BJC-52	
	(1) 500 kcmil	(2) 300 kcmil	(2) 350 kcmil	In top, horizontal wireway [9],[10]	2191MT-AKC-52	2191MT-AJC-52	
	(2) 750 kcmil	(4) 500 kcmil	(1) 750 kcmil (2) 500 kcmil	1.5 [8]	2191M_-CKC-52	2191M_-CJC-52	
	(4) 800 kcmil	—	(4) 750 kcmil	6.0 [11],[12], 20″ W	2191_ _-MKC-52	2191_ _-MJC-52	
800 [3] [4]	(2) 800 kcmil (4) 600 kcmil	—	(2) 750 kcmil (4) 500 kcmil	1.0 [8],[9]	2191_ T-BKC-54	2191_ T-BJC-54	
	(1) 750 kcmil (2) 600 kcmil (4) 500 kcmil	—	(3) 500 kcmil (4) 350 kcmil	1.5 [8]	2191_ _-CKC-54	2191_ _-CJC-54	
	(1) 800 kcmil (2) 750 kcmil (4) 600 kcmil	—	(2) 750 kcmil (4) 500 kcmil	2.0 [8]	2191_ _-DKC-54	2191_ _-DJC-54	
800	(4) 800 kcmil	—	(4) 750 kcmil	6.0 [11],[12], 20″ W	2191_ _-MKC-54	2191_ _-MJC-54	
1200 [3] [4]	(2) 800 kcmil (4) 600 kcmil	—	(2) 750 kcmil (4) 500 kcmil	1.0 [8],[9]	2191_ T-BKC-56	2191_ T-BJC-56	
	(1) 800 kcmil (2) 750 kcmil (4) 600 kcmil	—	(2) 750 kcmil (4) 500 kcmil	2.0 [8]	2191_ _-DKC-56	2191_ _-DJC-56	
1200	(4) 800 kcmil	—	(4) 750 kcmil	6.0 [11],[12], 20″ W	2191_ _-MKC-56	2191_ _-MJC-56	
1600		—			2191_ _-MKC-58	2191_ _-MJC-58	
2000	(6) 800 kcmil	—	(6) 750 kcmil		2191_ _-MKC-60	2191_ _-MJC-60	

(1) 300 A 2191F can only be used with 600 A and 800 A horizontal bus ratings

(2) 600 A 2191F can only be used with 600 A, 800 A, 1200 A, and 1600 A horizontal bus ratings.

(3) Main and feeder rating must match horizontal bus rating. Full-rated neutral bus for 1200 A, 2191M units requires a 6.0 space factor lug compartment.

(4) Feeder rating must match horizontal bus rating when 2191F is less than 6.0 space factor.

(5) By using a larger wire/lug size than is listed violates bend radius guidelines as listed in NEC/UL/C-UL wire bending tables and voids UL/C-UL listing and CSA certification.

(6) The maximum possible rating of this unit is 300 A. The rating of this unit can be determined by subtracting the current requirements of the units in the 3.0 space factors above or below this unit. Review NEC/CEC for further information.

(7) The maximum possible rating of this unit is 600 A. The rating of this unit can be determined by subtracting the current requirements of the units in the 3.0 space factors above or below this unit. Review NEC/CEC for further information.

(8) Cannot be mounted in section containing other frame mounted units (transformer units excluded). Unit compartments 1.0 through 2.0 space factors must be located at top or bottom of section.

(9) Pullbox required. Must be mounted at top of vertical section. Cannot be mounted in section containing other frame mounted units (transformer units excluded).

(10) Not available with incoming neutral bus.

(11) Shipped in single shipping split only. Frame mounted unit, section does not have vertical wireway.

(12) Unit is 4.5 space factors in a 71″ high section. The catalog number must be changed from 2191_ _ - M to 2191_ _-J (for example, 2191MT-**J**KC-52).

(13) The catalog numbers listed are not complete:

- If required, insert **M** for main or **F** for feeder (for example, 2191**M** or 2191**F**).
- If required, insert **T** for top mounted or **B** for bottom mounted (for example, 2191M**T** or 2191MB).
- If using optional lugs, select from table on page 86. Then add catalog string number to base catalog number (for example, 2191MT-CKC-52-**82B500**).

Lug Compartments Provisions for Inside Corner, 10” Wide Sections, and Neutrals/ Incoming Line and Outgoing Feeders

- See page 32 for section descriptions.
- Basic configuration includes cover plates, lug pads, and hardware.
- Configure section and lugs separately.
- Metering options not available.
- For 71” high sections, see restrictions on page 32.
- Refer to Appendix for wire size conversion table.
  2191FT—Top mounted feeder
  2191FB—Bottom mounted feeder
  2191MT—Top mounted main
  2191MB—Bottom mounted main

Table 55 -

Rating (Amperes)	Cable Provisions (3) Maximum Number Per Phase and Maximum Cable Size		Space Factor	Catalog Number (5) Wiring Type A—Class I		Delivery Program
	Mechanical Type Lugs	Crimp Type Lugs		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
	Single Cable Lug					
PROVISIONS FOR INSIDE CORNER SECTION						
600(1)	(4) 800 kcmil	(4) 750 kcmil	6.0 (4)	2191__-NKC-52	2191__-NJC-52	PE-II
800				2191__-NKC-54	2191__-NJC-54	
1200				2191__-NKC-56	2191__-NJC-56	
1600				2191__-NKC-58	2191__-NJC-58	
2000				2191__-NKC-60	2191__-NJC-60	
PROVISIONS FOR 10” WIDE SECTION (2)						
600(1)	Not Applicable	(2) 750 kcmil (4) 500 kcmil	6.0 (4)	2191__-PKC-52	2191__-PJC-52	PE-II
800				2191__-PKC-54	2191__-PJC-54	
1200				2191__-PKC-56	2191__-PJC-56	

(1) 600 A 2191F can only be used with 600 A, 800 A, 1200 A, and 1600 A horizontal bus ratings

(2) This section must be selected as part of a 2-section shipping split and shipped attached to a 20” wide section with standard depth horizontal power bus. It cannot be selected as free standing or attached to a 25" wide section with a 9” vertical wireway or any 6 space factor, frame-mounted unit. It is not available in NEMA Type 3R, Type 4, or back-to-back construction.

(3) By using a larger wire/lug size than is listed violates bend radius guidelines as listed in NEC/UL/C-UL wire bending tables and voids UL/C-UL listing and CSA certification.

(4) Not available in 71” high sections, NEMA Type 3R, or Type 4.

(5) The catalog numbers listed are not complete:
- Insert **M** for main or **F** for feeder (for example, 2191**M** or 2191**F**).
- Insert **T** for top mounted or **B** for bottom mounted (for example, 2191M**T** or 2191M**B**).
- If optional lugs will be selected, select from table on page 86. Then add catalog string number to base catalog number (for example, 2191MT-CKC-52-**82B500**).

Table 56 - Lug Dimensions for Bulletin 2191F and 2191M

Lug Size	Number of Cables Per Lug	Dimension 'A'	Refer to Figure
MECHANICAL TYPE LUGS			
#6-350 kcmil	1	2.13″ (54 mm)	1
#4/0-600 kcmil (1)	1	2.31″ (59 mm)	1
350-800 kcmil (2)	1	2.25″ (57 mm)	1
#6-350 kcmil (3)	2	2.13″ (54 mm)	2
#4/0-600 kcmil (3)	2	2.13″ (54 mm)	2
CRIMP TYPE LUGS (Panduit Type LCC)			
250 kcmil	1	2.94″ (75 mm)	3
350 kcmil		3.38″ (86 mm)	
500 kcmil		3.78″ (96 mm)	
750 kcmil		4.63″ (118 mm)	
CRIMP TYPE LUGS (Burndy YA-A Series)			
250 kcmil	1	2.91″ (74 mm)	3
350 kcmil		3.69″ (94 mm)	
500 kcmil		4.44″ (113 mm)	
750 kcmil		4.94″ (125 mm)	

(1) Recommended lug for 1600 A and 2000 A lug compartments.

(2) Two lugs per phase only when used on 1200 A lug compartment.

(3) Used in a horizontal wireway lug compartment when 2 cables per phase are specified, or when more than 2 cables per phase are specified in a 1.0 or 1.5 space factor 600 A lug compartment.

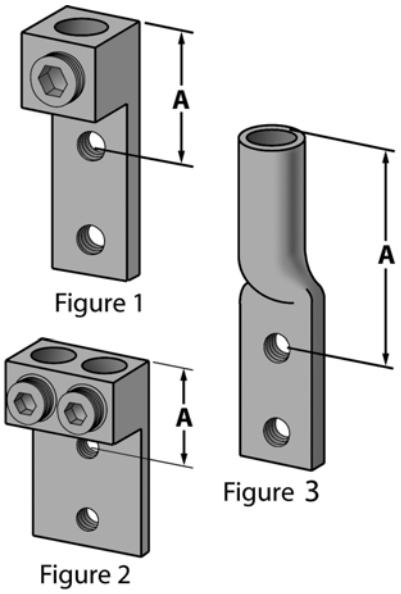


Figure 1

Figure 3

Figure 2

Lugs shown are drilled for 2-hole NEMA 1.75″ spacing.

Lug Compartments, continued

- CENTERLINE 2100 motor control centers are rated for use with 75 °C wire. Wire must be sized using the 75 °C column in NEC/UL/C-UL. The actual temperature rating of the lug is not relevant.
- Refer to the Appendix for a wire size conversion table.

Table 57 - Lug Selection

Wire/Cable Size	Catalog String No. (2)	Wire Range
MECHANICAL TYPE LUGS FOR ALUMINUM/COPPER WIRE (1)		
#6 AWG	-80_006	#6-350 kcmil
#4 AWG	-80_004	
#2 AWG	-80_002	
#1 AWG	-80_001	
#1/0 AWG	-80_1X0	
#2/0 AWG	-80_2X0	
#3/0 AWG	-80_3X0	
#4/0 AWG	-80_4X0	
250 kcmil	-80_250	
300 kcmil	-80_300	
350 kcmil	-80_350	
400 kcmil	-80_400	#4/0-600 kcmil
500 kcmil	-80_500	
600 kcmil	-80_600	
700 kcmil	-80_700	350-800 kcmil
750 kcmil	-80_750	
800 kcmil	-80_800	
CRIMP TYPE LUGS (Panduit Type LCC) FOR COPPER WIRE		
250 kcmil	-82_250	—
350 kcmil	-82_350	
500 kcmil	-82_500	
750 kcmil	-82_750	
CRIMP TYPE LUGS (Burndy YA-A Series) FOR ALUMINUM or COPPER WIRE		
250 kcmil	-83_250	—
350 kcmil	-83_350	
500 kcmil	-83_500(3)	
750 kcmil	-83_750	

(1) Mechanical lugs are available for use with 42 kA bus bracing. For applications requiring over 42 kA bus bracing, use crimp type lugs only.

(2) Catalog string numbers listed are not complete. Select the appropriate letter from Lug Quantity table to identify the number of cables per phase desired (for example, 2191MT-AAC-52-80**B**4X0). When optional neutral incoming bus is desired, optional neutral lugs will be the same type as those for 3-phase cable. Only one option code is needed.

(3) Only one or two cables per phase allowed in 10″ wide lug compartment.

Table 58 - Lug Quantity

Letter	Number of Cables per Phase (1)
A	1
B	2
C	3
D	4
E	5
F	6

(1) If optional full-rated incoming neutral bus (see page 161) is specified, the quantity and size/type of the lugs on neutral lug pad is the same as the 3-phase lugs. When optional half-rated incoming neutral bus (see page 161) is specified and one or two lugs per phase are specified, one lug is provided on the half-rated neutral riser. When three or four lugs are specified, two lugs are provided. When five or six lugs are specified, three lugs are provided on half-rated neutral riser.

Bulletin 2191M Lug Compartments/Incoming Line—Dimensions

- Lug pads shown on page 90 are drilled for 2-hole NEMA 1.75″ spacing.
- Top- and bottom-mounted mains are designed with adequate space to route cables to lugs. Give special consideration to the mounting of the CTs for a metering device. Consider the addition of a pull box.

Table 59 - Top Entry(1)

Compartment Size (Space Factor)	Ratings (Amperes)	Refer to Figure (2)	Dimensions A			Dimension B	Maximum No. of Cables per Phase	Maximum Number of Lugs per Phase	
			L1	L2	L3	Total Available Space with Pullbox		Single Cable	Double Cable
In horiz. WW (pullbox required)	600	1	—	—	—	13.19″ (335 mm)	2	1	1
1.0	300	2	12.81″ (325 mm)	12.81″ (325 mm)	12.81″ (325 mm)	24.81″ (630 mm)	2	2	—
1.0	600	2	12.81″ (325 mm)	12.81″ (325 mm)	12.81″ (325 mm)	24.81″ (630 mm)	4	2	2
1.0 (pullbox required)	800 1200	3	—	—	—	21.56″ (548 mm)	4	4	N/A
1.5	600	2	19.31″ (490 mm)	19.31″ (490 mm)	19.31″ (490 mm)	31.31″ (795 mm)	4	2	2
	800	3	15.75″ (400 mm)	15.75″ (400 mm)	15.75″ (400 mm)	27.75″ (705 mm)	4	4	N/A
			16.63″ (422 mm) (3)	16.63″ (422 mm) (3)	16.63″ (422 mm) (3)	28.63″ (727 mm)	2	2	
2.0	800 1200	3	20.00″ (508 mm)	20.00″ (508 mm)	20.00″ (508 mm)	32.00″ (813 mm)	4	4	
			20.88″ (530 mm) (3)	20.88″ (530 mm) (3)	20.88″ (530 mm) (3)	32.88″ (835 mm)	2	2	
6.0 (20″ wide)	600 800 1200 1600	4	37.63″ (956 mm)	44.13″ (1121 mm)	50.63″ (1286 mm)	—	4	4	
	2000	4	37.63″ (956 mm)	44.13″ (1121 mm)	50.63″ (1286 mm)	—	6	6	
6.0 (corner section)	600 800 1200 1600 2000	5	37.63″ (956 mm)	44.13″ (1121 mm)	50.63″ (1286 mm)	—	4	4	
6.0 (10″ wide)	600 800 1200	6	35.88″ (911 mm)	42.38″ (1076 mm)	48.88″ (1242 mm)	—	4	4	

(1) Depending on wire size and wires per phase, pullbox is required to meet wire bending radius as specified by NEC/UL/C-UL.
(2) See page 90 for figures.
(3) When cable size selected limits the user to two single lugs per phase, Dimension A is measured from center set of holes in lug pad. See Figure 3 on page 90.

Table 60 - Bottom Entry

Compartment Size (Space Factor)	Ratings (Amperes)	Refer to Figure (1)	Dimensions A			Maximum No. of Cables per Phase	Maximum Number of Lugs per Phase	
			L1	L2	L3		Single Cable	Double Cable
1.0	300	2	12.81″ (325 mm)	12.81″ (325 mm)	12.81″ (325 mm)	2	2	N/A
1.0	600	2	12.81″ (325 mm)	12.81″ (325 mm)	12.81″ (325 mm)	4	2	2
1.5	600	2	19.31″ (490 mm)	19.31″ (490 mm)	19.31″ (490 mm)	4	2	2
	800	3	15.75″ (400 mm)	15.75″ (400 mm)	15.75″ (400 mm)	4	4	N/A
			16.63″ (422 mm) (2)	16.63″ (422 mm) (2)	16.63″ (422 mm) (2)	2	2	
2.0	800 1200	3	20.00″ (508 mm)	20.00″ (508 mm)	20.00″ (508 mm)	4	4	
			20.88″ (530 mm) (2)	20.88″ (530 mm) (2)	20.88″ (530 mm) (2)	2	2	
6.0 (20″ wide)	600 800 1200 1600	4	50.63″ (1286 mm)	44.13″ (1121 mm)	37.63″ (956 mm)	4	4	
	2000	4	50.63″ (1286 mm)	44.13″ (1121 mm)	37.63″ (956 mm)	6	6	
6.0 (corner section)	600 800 1200 1600 2000	5	50.63″ (1286 mm)	44.13″ (1121 mm)	37.63″ (956 mm)	4	4	
6.0 (10″ wide)	600 800 1200	6	48.88″ (1242 mm)	42.38″ (1076 mm)	35.88″ (911 mm)	4	4	

(1) See page 90 for figures.

(2) When cable size selected limits the user to two single lugs per phase, Dimension A is measured from center set of holes in lug pad. See Figure 3 on page 90.

Bulletin 2191M Lug Compartments/Incoming Line—Dimensions

Dimensions for drawings are provided on page 88.

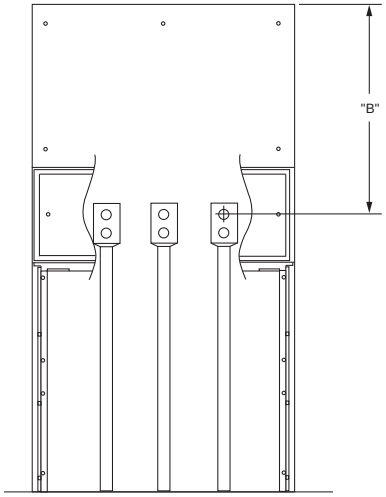


FIGURE 1

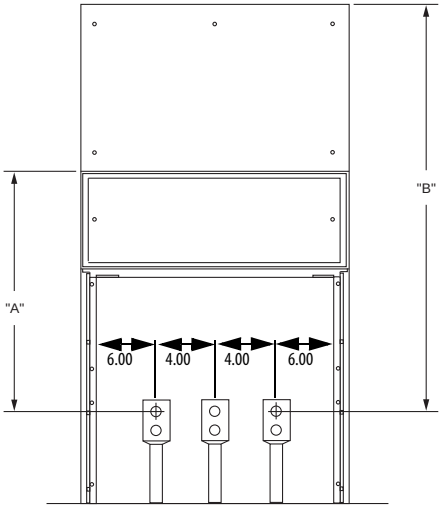


FIGURE 2

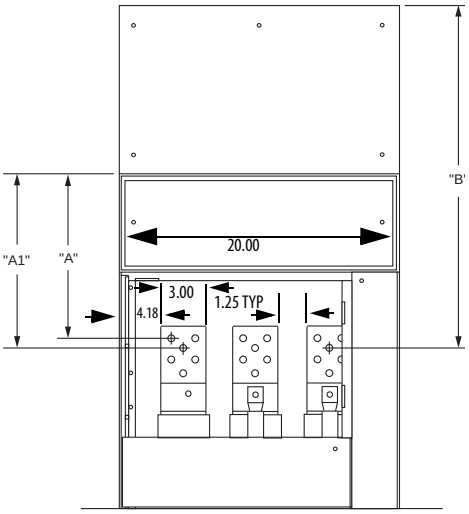


FIGURE 3

Phase A vertical bus on top incoming 2.0 space factors and Phase C vertical bus on bottom incoming 2.0 space factors are not required or supplied

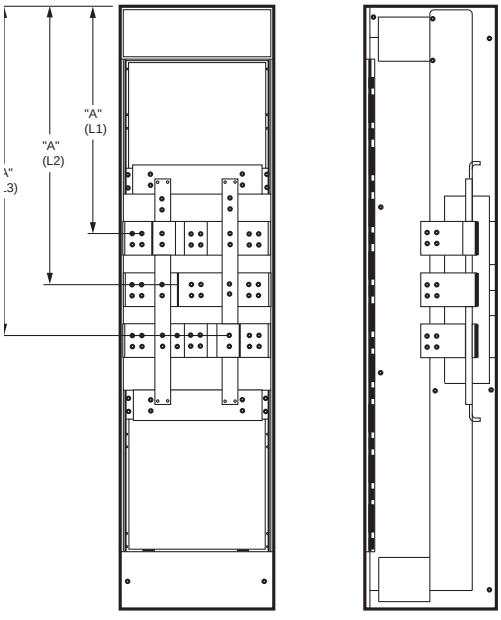


FIGURE 4

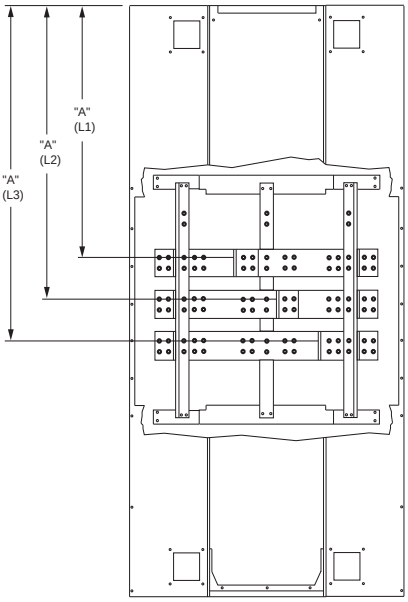


FIGURE 5

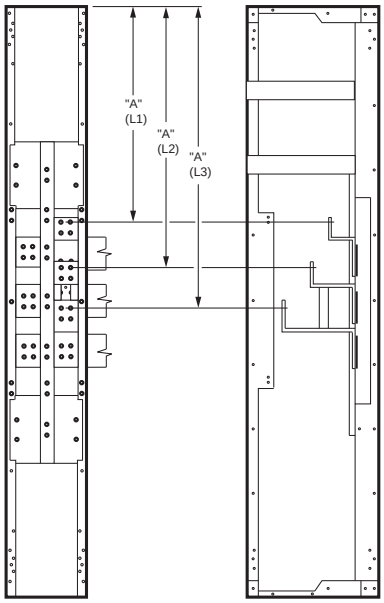


FIGURE 6

TIP All lug pads shown accept NEMA standard 2-hole lugs 1.75″ on center using 0.5″ hardware.

Bulletin 2192F and 2192M Feeder and Main Fusible Disconnect Switch Units (FDS, MFDS)

Bulletin 2192M and 2192F are fusible disconnect switches. These switches are available with ratings from 30…2000 A. The 2192F is a plug-in unit for ratings up to 200 A and frame mounted for ratings 400 A and above. The 2192M is frame mounted (rigidly mounted and hardwired) in the structure for all ratings. The bolted pressure switch design is used for 2192 units rated 600…2000 A.

Catalog Number Explanation - Bulletin 2192F and 2192M Fusible Disconnect Feeders and Mains

- 30…200 A Feeders are available as Plug-in Units
- 400…1200 A Feeders and all Mains are Frame Mounted
- 600…2000 A units have Visual Blade Bolted Pressure Switches

Table 61 -

2192F	T	-	B	K	C	-	24J	-	**
Bulletin Number	Mounting		Maximum Trip Ratings	NEMA Enclosure Type	Line Voltage		Fuse, Clip Rating and Class		Options

Code	Type
2192F	Fusible Disconnect Switch Feeder (FDS)
2192M	Main Fusible Disconnect Switch (MFDS)

Code	Mounting
T (1)	Top
B (1)	Bottom
Z	0.5 Space Factor

(1) A 'T' or 'B' is required for all 2192M units and only 400A and above 2192F units.

Code	Maximum Trip Ratings
B	30 A
C	60 A
D	100 A
E	200 A
F	400 A
G	600 A
H	800 A
J	1200 A
K	1600 A
L	2000 A

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Line Voltage
P	220/230V
A	Up to 250V
N	380V
KN	400V
I	415V
B	480V
C	Up to 600V

Code	Fuse, Clip Rating and Class
See Fuse Clip Sizes/Type on page 92.	

Code	Options
See Options section beginning on page 145.	

Bulletin 2192F Fusible Disconnect Switch—Feeders (FDS)

- See page 91 for product description.
- Select disconnect switch rating based upon 125% of actual load amperes. Refer to NEC/CEC.
  2192FZ—Plug-in unit, 0.5 space factor, 30 A only.
  2192F—Plug-in unit, 30…200 A.
  2192FT—Top-mounted feeder, 400 A are top-fed, connect load to bottom of switch.
  2192FT—Top-mounted feeder, 600…1200 A are reverse-fed, connect load to top of switch.
  2192FB—Bottom-mounted feeder, 400…1200 A are top-fed, connect load to bottom of switch.
- Refer to Appendix for horsepower ratings.
- Refer to Appendix for wire size conversion table.

Table 62 -

Switch Rating (Amperes)		Fuse Clip		Load Lugs Provided			Space Factor	Catalog Number (4) Wiring Type A Only—Class I		Delivery Program
		Rating (Amperes)	Class	Cables / Phase	Cable/Wire Size Range	Wire Type		NEMA Type 1 or Type 1 w/ gasket	NEMA Type 12	
30	These units have horizontal operating handles and Bulletin 194R fused disconnect switch. See page 29 for information on installation into series E-J sections.	30	CC, J	1	#14-#8 AWG	CU	0.5	2192FZ-BKC-___	2192FZ-BJC-___	SC
30	Wired to pull-apart terminal blocks as standard. For unit without power terminal blocks, add 110 to the catalog number string (N/C). Unit will then be supplied with a separately mounted disconnect switch and fuse block.	30	CC, J, R, H	1	#14-#4 AWG		1.0	2192F-BK_-___	2192F-BJ_-___	
60		60	J, R, H	1		CU	1.0	2192F-CK_-___	2192F-CJ_-___	
Dual 30 (1)	Dual disconnects use Cutler-Hammer fusible switches. Duals must have identical fuse clip types. **Only** 30 A and 60 A disconnects with 600V Class H and R fuse clips are wired to pull-apart terminal blocks. Dual units require two sets of fuses. The fuse size code must correspond to the respective fuse clip designator code. The fuse manufacturer for both fuses must be the same (for example, 2192F-CAC-2524J-609602G). Larger switch must be mounted on the left side.	30						2192F-BK_-2424___	2192F-BJ_-2424___	
Dual 60/30 (1)		60/30						2192F-CK_-2524___	2192F-CJ_-2524___	
Dual 60 (1)		60						2192F-CK_-2525___	2192F-CJ_-2525___	
Dual 100/30 (1)		100/30		1	#14-1/0 AWG #14-4 AWG	CU	1.5	2192F-DK_-2624___	2192F-DJ_-2624___	
Dual 100/60 (1)		100/60						2192F-DK_-2625___	2192F-DJ_-2625___	
Dual 100 (1)		100		1	#14-1/0 AWG	CU		2192F-DK_-2626___	2192F-DJ_-2626___	
100		100		1	#8-1/0 AWG	CU		2192F-DK_-___	2192F-DJ_-___	
200		200		1	#6-4/0 AWG	CU	2.0	2192F-EK_-___	2192F-EJ_-___	
400		400		2	#1/0-250 kcmil	CU	2.5 (2)	2192F_-FK_-___	2192F_-FJ_-___	SC-II
600	Bolted pressure contact switch. Viewing window on door for visual verification of disconnect blades.	600	J, R, H, L	2	#2-600 kcmil	CU/AL	3.5 (3)	2192F_-GK_-___	2192F_-GJ_-___	
800		800	L	3	#6-350 kcmil		3.5 (3)	2192F_-HKC-___	2192F_-HJC-___	
1200		1200		4	#6-350 kcmil		3.5 (3)	2192F_-JKC-___	2192F_-JJC-___	

(1) Not available with DSA (options 11DSA2 and 11DSA3).
(2) Frame mounted unit. Must be located at top or bottom of section.
(3) Frame mounted unit, section does not have vertical wireway next to this unit. Must be located at top or bottom of section. Cannot be mounted in section containing other frame mounted units.
(4) The catalog numbers listed are not complete:
- For 400…1200 A, insert **T** for Top mounted or **B** for Bottom mounted (for example, 2192F**T**- or 2192F**B**-).
- Unless already selected, select the voltage from Fuse Clip Voltage table (for example, 2192F-BK**C**).
- Select the fuse clip designator from Fuse Clip Sizes/Types table (for example, 2192F-BKC-**24J**). For duals, add letter suffix only—numbers are already supplied in catalog number (for example,2192F-CKA-**2525J**).
- If power fuse is selected, select from table on page 317 (for example,, 2192F-BKC-24J-**603G**). Double code number for duals (for example, 603603G).
- For fuse rating, based on disconnect rating, see publication 2100-TD003.
- If optional load lugs are selected, select from table on page 95. Add option number to base catalog number (for example, 2192F-GKC-29R-603G-**82B500**).

Table 63 -

Fuse Clip Voltage

Fuse Clip Voltage	Voltage Code
220…230	P (2)
240	A (2)
250	A (1)
380	N (2)
400	KN (2)
415	I (2)
480	B (2)
600	C

Fuse Clip Sizes/Types and UL Listed Short Circuit Withstand Ratings for Fusible Disconnect Switch Units (2192FT, 2192FB, 2192MT, 2192MB)

Fuse Clip Type	Fuse Clip Designator (Amperes)										Available Short Circuit Amperes (rms symmetrical) through 600V
	30 A	60 A	100 A	200 A	400 A	600 A	800 A	1200 A	1600 A	2000 A	
J	24J	25J	26J	27J	28J	29J	—	—	—	—	100 kA
R	24R	25R	26R	27R	28R	29R	—	—	—	—	100 kA
H	24	25	26	27	28	29	—	—	—	—	10 kA
L	—	—	—	—	—	23L (4)	24L	25L	26L	27L	100 kA
CC	24C	—	—	—	—	—	—	—	—	—	100 kA
Non-fused (3)	—	—	—	—	—	00N	00N	00N	00N	00N	100 kA (5)

(1) Not available for 1600 A or 2000 A 2192M.

(2) These voltage codes are to be used only when ground fault protection (option 88GF) is selected on 1600…2000 A 2192M units.

(3) Available on mains (2192MT, 2192MB) only. This is 100% rated and can be supplied in NEMA 1, 1 with gasket, and 12. Not available in NEMA type 3R or 4 enclosures. Not available as standard with 100 kA series coordinated bus bracing, consult factory.

(4) For 600 A, 100% rated, Class L fuses are the only valid option. 23L indicates provision for a 601A, Class L.

(5) Short circuit withstand is 100 kA only when protected upstream with Class L fuses that are sized in accordance with particular switch (for example, 800 A upstream fuses are to be used with 800 A switch or 2000 A upstream fuses are to be used with 2000 A switch).

Bulletin 2192M Fusible Disconnect Switch—Mains (MFDS)

- See page 91 for product description.
- Select disconnect switch rating based upon 125% of actual load amperes. Refer to NEC/UL/C-UL.
- Mains are suitable for use as service entrance per NEC (UL) and CEC (CSA). If application is a four-wire system, a neutral connection plate rated for 280 A is available. Select on pages 35, 144, 162 and 326. If a Neutral connection greater then 280 A is required, refer to page 35 and page 162 or contact your local Allen-Bradley distributor or Rockwell Automation sales representative.
- Mains rated 1000 A and above may require ground fault protection. For 1000…1200 A applications that require ground fault protection, contact your local Allen-Bradley distributor or Rockwell Automation sales representative. For 1600…2000 A applications that require ground fault protection, see option 88GF on page 159.
- Non-fused mains are available in 600…2000 A. See Fuse Clip Sizes/Types table on page 93.
  2192MT—Top-mounted main, 30…2000 A are top-fed.
  2192MB—Bottom-mounted main, 30…400 A are top-fed.
  2192MB—Bottom-mounted main, 600…2000 A are reverse-fed.
- Top- and bottom-mounted mains are designed with adequate space to route cables to lugs. Give special consideration to the mounting of the CTs for a metering device. Consider the addition of a pull box.
- Refer to Appendix for wire size conversion table.
- Includes line terminal guard.

Table 64 -

Switch Rating (Amperes)	Fuse Clip		Line Lugs Provided			Space Factor	Catalog Number [8] Wiring Type A Only—Class I		Delivery Program
	Rating (Amperes)	Class	Cables /Phase	Cable/Wire Size Range [4]	Wire Type		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
30	30	J, R, H	1	#14-#8 AWG	CU	1.5 [5]	2192M_-BK_-___	2192M_-BJ_-___	SC-II
60	60		1	#14-#6 AWG	CU		2192M_-CK_-___	2192M_-CJ_-___	
100	100		1	#8-1/0 AWG	CU		2192M_-DK_-___	2192M_-DJ_-___	
200	200		1	#6-4/0 AWG	CU	2.0 [5]	2192M_-EK_-___	2192M_-EJ_-___	
400	400		2	1/0-250 kcmil	CU	2.5 [5]	2192M_-FK_-___	2192M_-FJ_-___	
600 [1],[2],[3]	600	J, R, H, L	2	#2-600 kcmil	CU/AL	3.5 [6]	2192M_-GK_-___	2192M_-GJ_-___	
800 [1],[2],[3]	800	L	3	#6-350 kcmil	CU/AL		2192M_-HKC-___	2192M_-HJC-___	
1200 [1],[2],[3]	1200		4	#6-350 kcmil	CU/AL		2192M_-JKC-___	2192M_-JJC-___	
1600 [1],[2],[3]	1600		4	#2-600 kcmil	CU/AL	6.0 20″ D 35″ W [7]	2192M_-KK_-___	2192M_-KJ_-___	
2000 [1],[2],[3]	2000		6	#2-600 kcmil	CU/AL		2192M_-LK_-___	2192M_-LJ_-___	

(1) Fusible disconnect switch is a bolted pressure switch. No vertical wireway. Not available in NEMA Type 3R or Type 4 for 1600 A and 2000 A. The 600 . . . 1200 A units have viewing window on door for visual verification of disconnect blades.

(2) Units having 100% ratings are available for these fusible disconnect switches for NEMA Type 1 and Type 1 with gasket only. Non-fused switches are 100% rated and available in NEMA 1, 1 with gasket, and 12. See options on page 168 to select. For 100% rated 1600 A and 2000 A units, no top or bottom wireway is present above or below the unit and the unit must be located at either end of the motor control center lineup.

(3) When used with a 3-phase, 4-wire power system, horizontal neutral bus and incoming neutral bus is required.

(4) If optional full-rated incoming neutral bus (see page 161) is specified, the quantity and size/type of the lugs on neutral lug pad will be the same as the 3-phase lugs. When optional half-rated incoming neutral bus (see page 161) is specified and one or two lugs per phase are specified, one lug is provided on the half-rated neutral riser. When three or four lugs are specified, two lugs are provided. When five or six lugs are specified, three lugs are provided on half-rated neutral riser.

(5) Frame mounted unit. Must be located at top or bottom of section.

(6) Frame mounted unit, section does not have vertical wireway next to this unit. Must be located at top or bottom of section. May not be mounted in section containing other frame mounted units.

(7) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5″ deeper than standard. A special bus splice kit is provided when this unit is supplied adjacent to a section with standard depth bus.

(8) The catalog numbers listed are not complete:

- Insert **T** for Top mounted or **B** for Bottom mounted (for example, 2192M**T**- or 2192M**B**-).
- Unless already selected, select the voltage code from table on page 93 (for example, 2192MT-GK**C**).
- Then select the appropriate fuse clip designator from Fuse Clip Sizes/Types on page 93 (for example, 2192MT-GKC-**29J**).
- If power fuse is selected, select from table on page 317 (for example, 2192MT-GKC-29J-**629G**).
- For fuse rating, based on disconnect rating, see publication 2100-TD003.
- If optional line lugs are selected, select from Optional Crimp Lugs for Bulletins 2192FT, 2192FB, 2192MT and 2192MB table below (for example,2192MT-GKC-29J-629G-**82B500**).

Table 65 - Optional Crimp Lugs for Bulletins 2192FT, 2192FB, 2192MT and 2192MB(1)

Switch Size	Type of Lug	Cables/ Phase	Cable/Wire Size or Range	Wire Type	Option Number (2)	2192FT 2192FB	2192MT 2192MB
200 A	Mechanical Only	1	#6-250 kcmil	CU	81A250	✓	✓
400 A	Panduit Type LCC	2	250 kcmil	CU	82B250		✓(3),(4)
		1	500 kcmil	CU	82A500		✓ (3),(4),(5)
	Burndy YA-A Series	2	250 kcmil	CU/AL	83B250		✓(3),(4)
		1	500 kcmil	CU/AL	83A500		✓(3),(4),(5)
600 A	Panduit Type LCC	2	500 kcmil	CU	82B500	✓(4)	✓(4)
	Burndy YA-A Series	2		CU/AL	83B500	✓(4)	✓(4)
800 A	Panduit Type LCC	3		CU	82C500	✓(4)	✓(4)
	Burndy YA-A Series	3		CU/AL	83C500	✓(4)	✓(4)
1200 A	Panduit Type LCC	4		CU	82D500	✓(4)	✓(4)
	Burndy YA-A Series	4		CU/AL	83D500	✓(4)	✓(4)
1600 A	Panduit Type LCC	5		CU	82E500		✓(4)
	Burndy YA-A Series	5		CU/AL	83E500		✓(4)
2000 A	Panduit Type LCC	6		CU	82F500		✓(4)
	Burndy YA-A Series	6		CU/AL	83F500		✓(4)

(1) Basic configuration includes set of lugs for three phases (and lug pads for the 400 A switch size).

(2) If optional full-rated incoming neutral bus (see page 161) is specified, the quantity and size/type of the lugs on neutral lug pad will be the same as the 3-phase lugs. When optional half-rated incoming neutral bus (see page 161) is specified and one or two lugs per phase are specified, one lug is provided on the half-rated neutral riser. When three or four lugs are specified, two lugs are provided. When five or six lugs are specified, three lugs are provided on half-rated neutral riser.

(3) For top entry of incoming cables only.

(4) Disconnect supplied with lug pad assembly, reference page 327 for additional lugs.

(5) Requires pullbox. Select on page 38.

Bulletin 2193F and 2193M Feeder and Main Circuit Breaker Units (FCB, MCB)

Bulletin 2193F and 2193M are circuit breaker units with trip ratings available from 15…3000 A. These units are available with thermal magnetic trips up to 250 A and electronic trips 300 A and above.

- All trip ratings above 300 A are electronic trip, which includes long, short, and instantaneous (LSI) protection as standard.
- Groud fault protection (LSIG) is available as an option on 600 A and above and as standard on R-frame circuit breakers.
- Electronic trip (LSI) is available as an option on H-frame and J-frame circuit breakers.

The 2193F is a plug-in unit for ratings up to 300 A and is a frame mounted unit for ratings 400 A and above. The 2193M is frame mounted for all ratings.

Catalog Number Explanation - Bulletin 2193F and 2193M Circuit Breaker Feeders and Mains

- 125 A and 250 A Frame Feeders through 225 A Trip are Plug-in Units
- 400 A Frame with 300 A trip is a Plug-in Unit
- 400…3000 A Frame Feeders at 400 A Trip and above and all Mains are Frame Mounted
- Mains 600…3000 A available with Built in Ground Fault Protection

Table 66 -

2193F	T	-	B	K	C	-	30TGM	-	**
Bulletin Number	Mounting		Max Trip Rating	NEMA Enclosure Type	Line Voltage		Circuit Breaker Trip Size and Type		Options

Code	Type
2193F	Circuit Breaker Feeder (FCB)
2193M	Main Circuit Breaker (MCB)

Code	Mounting
T (1)	Top
B (1)	Bottom
Z	0.5 Space Factor

(1) A 'T' or 'B' is required for all 2193M units and all 400A frame and larger Bulletin 2193F units.

Code	Trip Rating
A	125 A
B	125 A
C	250 A
D	400 A
E	600 A
F	800 A
G	1200 A
J	2000 A
K	2500 A
L	3000 A

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Line Voltage
B	Up to 480V
C	Up to 600V

Code	Circuit Breaker Trip Size and Type
See table on page 100.	

Code	Options
See Options section beginning on page 145.	

Bulletin 2193F 3-Pole Feeder Circuit Breaker (FCB)

- See page 96 for product description.
- See Appendix for circuit breaker characteristics.
- Continuous current rating based on 40 °C ambient.
- Select circuit breaker frame and trip size based upon 125% of actual load amperes. Refer to NEC/CEC. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative if 100% rated circuit breakers are required.
- Two circuit breakers with trip current up to 100 A can be dual mounted in one plug-in unit for TGM, THM, THX, THML, THXL, and TJU frames. To specify dual mounted units, add two numbers from Table 68 to base catalog number (for example, 2193F-AJB-**3031**TGM). Half space factor units cannot be dual-mounted.
  2193F—Plug-in unit, 15…225 A.
  2193FZ—Plug-in unit, 0.5 space factor, 15…175 A.
  2193FT—Top-mounted feeder, 400 A are top-fed, connect load to bottom of switch.
  2193FT—Top-mounted feeder, 600…1200 A are reverse-fed, connect load to top of switch.
  2193FB—Bottom-mounted feeder, 400…1200 A are top-fed, connect load to bottom of switch.
- Includes line terminal guards for all circuit breaker units.

Table 67 -

Frame			Range of Available Trips (Amperes)	Interrupting Capacity Rating (RMS Symmetrical Amperes)			Space Factor	Catalog Number[17] Wiring Type A only - Class 1		Delivery Program
Rating (Ampere)	Trip Style[6]	Suffix		208V/240V	380V/400V 415V/480V	600V		NEMA Type 1 and Type 1 w/Gasket	NEMA Type 12	
125 A A[1]	Thermal Mag	TGM	15…100 A	100k	65k	-----	0.5[15]	2193FZ-AKB-_TGM	2193FZ-AJB-_TGM	SC
			15…125 A	100k	65k	-----	1.0	2193F-AKB-_TGM	2193F-AJB-_TGM	SC
125 A B[2] [3]	Thermal Mag	THM	15…125 A	100k	65k	-----	1.0	2193F-BKC-_THM	2193F-BJC-_THM	SC
		THX		-----	100k	35k		2193F-BKC-_THX	2193F-BJC-_THX	SC
	LSI	THML	25 A, 60 A, 100 A, 125 A[9]	100k	65k	25k		2193F-BKC-_THML	2193F-BJC-_THML	PE
		THXL		-----	100k	35k		2193F-BKC-_THXL	2193F-BJC-_THXL	PE
	Thermal Mag	THM	15…100 A	100k	65k	25k	0.5[15]	2193FZ-BKC-_THM	2193FZ-BJC-_THM	SC
		THX		-----	100k	35k		2193FZ-BKC-_THX	2193FZ-BJC-_THX	SC
	LSI	THML	25 A, 60 A, 100 A[9]	100k	65k	25k		2193FZ-BKC-_THML	2193FZ-BJC-_THML	PE
		THXL		-----	100k	35k		2193FZ-BKC-_THXL	2193FZ-BJC-_THXL	PE
160 A C[3]	Thermal Mag	TJU	30…150 A	-----	-----	100k	0.5	2193FZ-CKC-_TJU	2193FZ-CJC-_TJU	SC
		TJU	30…150A	-----	-----	100k	1.0	2193F-CKC-_TJU	2193F-CJC-_TJU	SC
	LSI	TJUL	15 A, 40 A, 60 A, 100 A, 150 A	-----	-----	100k		2193FZ-CKC-_TJUL	2193FZ-CJC-_TJUL	PE
		TJUL	15 A, 40 A, 60 A, 100 A, 150 A	-----	-----	100k		2193F-CKC-_TJUL	2193F-CJC-_TJUL	PE

Table is continued on the next page.

Table 67 -

Frame			Range of Available Trips (Amperes)	Interrupting Capacity Rating (RMS Symmetrical Amperes)			Space Factor	Catalog Number[17] Wiring Type A only - Class 1		Delivery Program
Rating (Ampere)	Trip Style[6]	Suffix		208V/240V	380V/400V 415V/480V	600V		NEMA Type 1 and Type 1 w/Gasket	NEMA Type 12	
250 A C	Thermal Mag	TJM	70, 90…225 A	100k	65k	25k	1.5	2193F-CKC-_TJM	2193F-CJC-_TJM	SC
	Thermal Mag	TJX		-----	100k	35k		2193F-CKC-_TJX	2193F-CJC-_TJX	SC
	LSI	TJML	100 A, 150 A, 225 A [9] [10]	100k	65k	25k		2193F-CKC-_TJML	2193F-CJC-_TJML	PE
	LSI	TJXL		-----	100k	35k		2193F-CKC-_TJXL	2193F-CJC-_TJXL	PE
	Thermal Mag	TJM	70, 90…175 A	100k	65k	25k	0.5[15]	2193FZ-CKC-_TJM	2193FZ-CJC-_TJM	SC
	Thermal Mag	TJX		-----	100k	35k		2193FZ-CKC-_TJX	2193FZ-CJC-_TJX	SC
	LSI	TJML	100 A, 150 A, 200 A [9] [11]	100k	65k	25k		2193FZ-CKC-_TJML	2193FZ-CJC-_TJML	PE
	LSI	TJXL		-----	100k	35k		2193FZ-CKC-_TJXL	2193FZ-CJC-_TJXL	PE
	LSI	T4ML	225 A[10]	100k	65k	35k		2193FZ-CKC-_T4ML	2193FZ-CJC-_T4ML	PE
	LSI	T4XL		-----	100k	65k		2193FZ-CKC-_T4XL	2193FZ-CJC-_T4XL	PE
	LSI	T4UL		-----	-----	100k		2193FZ-CKC-_T4UL	2193FZ-CJC-_T4UL	PE
400 A D[4]	LSI	TKM	300 A, 400 A [12]	100k	65k	25k	2.0[16]	2193F_-DKC-_TKM	2193F_-DJC-_TKM	PE
	LSI	TKX		-----	100k	65k		2193F_-DKC-_TKX	2193F_-DJC-_TKX	PE
	LSI	TKU		-----	-----	100k		2193F_-DKC-_TKU	2193F_-DJC-_TKU	PE
800 A E[4]	LSI	TMM	600 A [9]	100k	65k	25k	2.0 [16]	2193F_-EKC-_TMM	2193F_-EJC-_TMM	SC
	LSI	TMX		-----	100k	42k		2193F_-EKC-_TMX	2193F_-EJC-_TMX	SC
	LSIG[7]	TMMG		100k	65k	25k		2193F_-EKC-_TMMG	2193F_-EJC-_TMMG	PE
	LSIG[7]	TMXG		-----	100k	42k		2193F_-EKC-_TMXG	2193F_-EJC-_TMXG	PE
800 A F[4]	LSI	TMM	800 A[9]	100k	65k	25k	2.5	2193F_-FKC-_TMM	2193F_-FJC-_TMM	SC
	LSI	TMX		-----	100k	42k		2193F_-FKC-_TMX	2193F_-FJC-_TMX	SC
	LSIG[7]	TMMG	800 A[9]	100k	65k	25k		2193F_-FKC-_TMMG	2193F_-FJC-_TMMG	PE
	LSIG[7]	TMXG		-----	100k	42k		2193F_-FKC-_TMXG	2193F_-FJC-_TMXG	PE
	HI-MAG	TMN	800 A		65k			2193F_-FKC-_TMN	2193F_-FJC-_TMN	PE
1200 A G[4] [5]	LSI	TNM	400 A, 600 A, 800 A, 1000 A, 1200 A[13]	100k	65k	-----	3.5	2193F_-GKC-_TNM	2193F_-GJC-_TNM	SC
	LSIG[7]	TNMG		100k	65k	-----		2193F_-GKC-_TNMG	2193F_-GJC-_TNMG	PE
	LSI	TNX[8]		-----	100k	65k		2193F_-GKC-_TNX	2193F_-GJC-_TNX	SC
	LSIG[7]	TNXG[8]		-----	100k	65k		2193F_-GKC-_TNXG	2193F_-GJC-_TNXG	PE
	HI-MAG	TNN	1200 A		65k			2193F_-GKC-_TNN	2193F_-GJC-_TNN	PE

Table is continued on the next page.

Table 67 -

Frame			Range of Available Trips (Amperes)	Interrupting Capacity Rating (RMS Symmetrical Amperes)			Space Factor	Catalog Number(17) Wiring Type A only - Class 1		Delivery Program
Rating (Ampere)	Trip Style(6)	Suffix		208V/240V	380V/400V 415V/480V	600V		NEMA Type 1 and Type 1 w/Gasket	NEMA Type 12	
3000 A J(4)	LSIG(7)	TRUG	1000 A, 1200 A, 1600 A, 2000 A(14)	100k	100k	100k	6.0 30" W 15" D	2193F_-JKC-_TRUG	2193F_-JJC-_TRUG	PE
				100k	100k	100k				PE
3000 A K(4)	LSIG(7)		2500 A(14)	100k	100k	100k	6.0 30" W 15" D	2193F_-KKC-_TRUG	2193F_-KJC-_TRUG	PE

(1) Non-interchangeable trip breakers.
(2) Non-interchangeable trip breakers at 40 A or below.
(3) Option -11DSA2 or -11DSA3 not available with 2193FZ units.
(4) Frame mounted unit must be mounted at top or bottom of section.
(5) Standard design supports 500MCM max. wire size. For larger cables contact your local Allen-Bradley distributor or Rockwell Automation sales representative for alternate design considerations.
(6) LSI = Long - Short - Instantaneous Electronic Trip
LSIG = Long - Short - Instantaneous - Ground Electronic Trip
Thermal Mag = Thermal Magnetic
HI-MAG = NOT UL listed. Internal auxiliary contacts (-790_) are not available on this breaker. Unit supplied with molded case switch with fixed high magnetic trip. Requires upstream current limiting branch protection. See molded case switch markings for proper selection of this protection. Ratings listed are the maximum fault currents that can be applied to the devices.
(7) The ground fault protection system is suited for solidly grounded system. Ground fault trip range is adjustable from 0.2 to 1 times the trip current rating of the circuit breaker rating plug. The time delay setting can be adjusted from 0.1…0.8 seconds.
(8) Only available as top mounted at 600V unless MCC is Device Limited Arc Shield.
(9) Value shown is max setting of trip unit. Trip unit is electronic, adjustable by 2% increments to 40…100% of maximum value selected. 225 A maximum value due to rating of plug-in stab.
(10) 225A unit is supplied with a 250A trip unit. Unit will ship set to 225A which is also the maximum setting allowed.
(11) 200 A unit is supplied with a 250 A trip unit. Unit will ship set to 200 A which is also the maximum setting allowed.
(12) Value shown is max setting of trip unit. Trip unit is electronic, adjustable by 4% to 40…100% of maximum value selected.
(13) Value shown is max setting of trip unit. Trip unit is electronic, adjustable by 4% or 2.5% increments to 40…100% of maximum value selected
(14) Value shown is max setting of trip unit. Trip unit is electronic, adjustable by 2.5% increments to 40…100% of maximum value selected
(15) These units have horizontal operating handles.
(16) A 300 A trip is a plug-in unit, a 400 A trip is a frame mounted unit.
(17) The catalog numbers listed are not complete:
Select the trip current from Table 68 (for example, 2193F-AKC-**40**TGM).
If optional load lugs will be selected, select from Table 69 (for example, 2193F-AKC-40TGM-**80A350**).

Bulletin 2193F 3-Pole Feeder Circuit Breaker (FCB), continued

- CENTERLINE 2100 motor control centers are rated for use with 75 °C wires. Wire must be sized by using the 75 °C column in NEC Table 310-16. The actual temperature rating of the lug is not relevant.
- Refer to Appendix for wire size conversion table.

Table 68 - Trip Current

Trip Current (Amperes)	Number	Trip Current (Amperes)	Number
15	30	250	46
20	31	300	48
25	61	400	50
30	32	600	52
40	34	800	54
50	35	1000	55
60	36	1200	56
70	37	1600	58
80	38	2000	60
90	39	2500	64
100	40	3000	65
125	41		
150	42		
175	43		
200	44		
225	45		

Table 69 - Mechanical Lugs for Feeders(1)

Frame Type	Rating (Amperes)	Trip Current (Amperes)	Space Factor	Cables/ Phase	Cable/Wire Size Range	Wire Type	Option Number (2)
Mechanical Lugs							
TGM	125	15…125		1	#14…1/0 AWG	CU	
THM, THX, THML, THXL	125	15…125	1.0 and larger	1	#14…1/0 AWG	CU	
			0.5	1	#14…1/0 AWG	CU/AL	
TJM, TJX, TJU, TJML, TJXL, TJUL	250	60 or less	1.5 or larger	1	#14…1/0 AWG	CU/AL	
		70…250			#10…250 kcmil	CU	
					#14…1/0 AWG	CU/AL	80A1X0
					#10...350 kcmil #6...350 kcmil	CU AL	80A350
		60 or less	0.5		#14…2/0 AWG	CU/AL	
		70…250			#6...350 kcmil	CU	
TKM, TKX, TKU, TK_L, TK_G	400	300		1	250…500 kcmil	CU	
						CU/AL	80A500
		400		2	#2/0…250 kcmil	CU	
						CU/AL	80B250
TMM, TMX, TMN, TM_G	800	600		2	#3/0...350 kcmil	CU	
					250...500 kcmil	CU/AL	80B500
		800		3	#2/0...350 kcmil	CU	
					#2/0…400 kcmil	CU/AL	80C400
TNM, TNX, TNN, TN_G	1200	600…1200		4	#4/0...500 kcmil	CU	
					#4/0…500 kcmil	CU/AL	80D500
TRUG	2000	1000…1600		4	#2…600 kcmil	CU/AL	
		2000		6			
	2500	2500		7			

(1) Lugs are designed for use with breaker frame. Standard crimp or mechanical lugs cannot be used without special lug pad assembly.

(2) If optional full-rated incoming neutral bus is specified, the quantity and size/type of the lug(s) on neutral lug pad will be the same as the 3-phase lugs. When optional half-rated incoming neutral bus is specified and one or two lugs per phase are specified, one lug is provided on the half-rated neutral riser. When three or four lugs are specified, two lugs are provided. When five or six lugs are specified, three lugs are provided on half-rated neutral riser.

Bulletin 2193M 3-Pole Main Circuit Breaker (MCB)

- See page 96 for product description.
- See Appendix for circuit breaker characteristics.
- Select circuit breaker frame and trip size based upon 125% of actual load amperes. Continuous current rating based on 40 °C ambient. Refer to NEC/CEC.
- Mains are suitable for use as service entrance per NEC (UL) and CEC (CSA). If application is a four-wire system, a neutral plate rated for 280 A is available, refer to page 35, 144, 162, and 326. If a neutral greater then 280 A is required, see page 35 or 162 or contact your local Allen-Bradley distributor or Rockwell Automation sales representative. Mains rated 1000 A and above may require ground fault protection. Refer to NEC/UL/C-UL.
- Main Breakers supplied with internal ground fault protection (breaker code T_ _ G) are supplied with a neutral CT for use on a 3 Phase, 4 Wire, Solidly Grounded 'WYE' System. Circuit breakers with internal ground fault protection are not designed for use on a Delta System, Ungrounded 'WYE' System or Impedance Grounded 'WYE' System.
- Main units are frame mounted. They must be located at the top or bottom of the section.
  2193MT—Top-mounted main, 150…3000 A are top-fed.
  2193MB—Bottom-mounted main, 150…400 A are top-fed.
  2193MB—Bottom-mounted main, 600…3000 A are reverse-fed.
- Top- and bottom-mounted mains are designed with adequate space to route cables to lugs. Give special consideration to the mounting of the CTs for a metering device. Consider the addition of a pull box.
- All trip ratings about 300 A are electronic trip, which includes long, short, and instantaneous (LSI) protection as standard.
- Groud fault protection (LSIG) is available as an option on 600 A and above and as standard on R-frame circuit breakers.
- Electronic trip (LSI) is available as an option on H-frame and J-frame circuit breakers.
- Includes line terminal guard for all circuit breaker units.

Table 70 -

Frame			Range of Available Trips (amperes)	Interrupting Capacity Rating (rms symmetrical amperes)			Space Factor	Catalog Number[13] Wiring Type A only - Class 1		Delivery Program
Rating (ampere)	Trip Style[5]	Suffix		208V/240V	380V/400V 415V/480V	600V		NEMA Type 1 and Type 1 w/Gasket	NEMA Type 12	
125 A A[1]	Thermal Mag	TGM	15…125 A	100k	65k	-----	1.5	2193M_-AKB-_TGM	2193M_-AJB-_TGM	SC
125 A B[2]	Thermal Mag	THM	15…125 A	100k	65k	-----		2193M_-BKC-_THM	2193M_-BJC-_THM	SC
	Thermal Mag	THX		-----	100k	35k		2193M_-BKC-_THX	2193M_-BJC-_THX	SC
250 A C	Thermal Mag	TJM	70, 90…225 A	100k	65k	-----		2193M_-CKC-_TJM	2193M_-CJC-_TJM	SC
		TJX		-----	100k	35k		2193M_-CKC-_TJX	2193M_-CJC-_TJX	SC
	LSI	TJML	40 A, 60 A, 100 A, 150 A, 250 A[9]	100k	65k	-----		2193M_-CKC-_TJML	2193M_-CJC-_TJML	PE
		TJXL		-----	100k	35k		2193M_-CKC-_TJXL	2193M_-CJC-_TJXL	PE
400 A D[3]	LSI	TKM	300 A, 400 A[10]	100k	65k	-----	2.0	2193M_-DKC-_TKM	2193M_-DJC-_TKM	SC
	LSI	TKX		-----	100k	65k		2193M_-DKC-_TKX	2193M_-DJC-_TKX	SC
		TKU		-----	-----	100k		2193M_-DKC-_TKU	2193M_-DJC-_TKU	SC

Table is continued on the next page.

Table 70 -

Frame			Range of Available Trips (amperes)	Interrupting Capacity Rating (rms symmetrical amperes)			Space Factor	Catalog Number[13] Wiring Type A only - Class 1		Delivery Program
Rating (ampere)	Trip Style[5]	Suffix		208V/240V	380V/400V 415V/480V	600V		NEMA Type 1 and Type 1 w/Gasket	NEMA Type 12	
800 A E	LSI	TMM	600 A[10]	100k	65k	-----	2.0.	2193M_-EKC-_TMM	2193M_-EJC-_TMM	SC
	LSI	TMX		-----	100k	42k		2193M_-EKC-_TMX	2193M_-EJC-_TMX	SC
	LSIG[6]	TMMG	600 A[10]	100k	65k	-----		2193M_-EKC-_TMMG	2193M_-EJC-_TMMG	PE
	LSIG[6]	TMXG		-----	100k	42k		2193M_-EKC-_TMXG	2193M_-EJC-_TMXG	PE
800 A F[3]	LSI	TMM	800 A[10]	100k	65k	-----	2.5	2193M_-FKC-_TMM	2193M_-FJC-_TMM	SC
	LSI	TMX		-----	100k	42k		2193M_-FKC-_TMX	2193M_-FJC-_TMX	SC
	LSIG[6]	TMMG	800 A[10]	100k	65k	-----		2193M_-FKC-_TMMG	2193M_-FJC-_TMMG	PE
	LSIG[6]	TMXG		-----	100k	42k		2193M_-FKC-_TMXG	2193M_-FJC-_TMXG	PE
	HI-MAG	TMN	800 A		65k			2193M_-FKC-_TMN	2193M_-FJC-_TMN	PE
1200 A G[3] [4]	LSI	TNM	400 A, 600 A, 800 A, 1000 A, 1200 A[9]	100k	65k	-----	3.5	2193M_-GKC-_TNM	2193M_-GJC-_TNM	SC
	LSIG[6]	TNMG		100k	65k	-----		2193M_-GKC-_TNMG	2193M_-GJC-_TNMG	PE
	LSI	TNX[7]		-----	100k	65k		2193M_-GKC-_TNX	2193M_-GJC-_TNX	SC
	LSIG[6]	TNXG[7]		-----	100k	65k		2193M_-GKC-_TNXG	2193M_-GJC-_TNXG	PE
	HI-MAG	TNN	1200 A		65k			2193M_-GKC-_TNN	2193M_-GJC-_TNN	PE
3000 A J[3]	LSIG[6]	TRUG[8]	1000 A, 1200 A, 1600 A, 2000 A[11]	100k	100k	100k	6.0 30" W 15" D	2193M_-JKC-_TRUG	2193M_-JJC-_TRUG	PE
3000 A K[3]	LSIG[6]		2500 A[11]				6.0 30" W 15" D [12]	2193M_-KKC-_TRUG	2193M_-KJC-_TRUG	PE
3000 A L[3]	LSIG[6]		3000 A[11]				6.0 30″ W 20″ D	2193M_-LKC-_TRUG	-----	PE

(1) Non-interchangeable trip breakers.

(2) Non-interchangeable trip breakers at 40A or below

(3) Frame mounted unit mus be mounted at top or bottom of section.

(4) Standard design supports 500MCM max. wire size. For larger cables contact your Rockwell MCC Specialist for alternate design considerations.

(5) LSI = Long - Short - Instantaneous Electronic Trip
LSIG = Long - Short - Instantaneous - Ground Electronic Trip
Thermal Mag = Thermal Magnetic
HI-MAG = NOT UL listed. Internal auxiliary contacts (-790_) are not available on this breaker. Unit supplied with molded case switch with fixed high magnetic trip. Requires upstream current limiting branch protection. See molded case switch markings for proper selection of this protection. Ratings listed are the maximum fault currents that can be applied to the devices.

(6) The ground fault protection system is suited for solidly grounded system. Ground fault trip range is adjustable from 0.2 to 1 times the trip current rating of the circuit breaker rating plug. The time delay setting can be adjusted from 0.1 to 0.8 seconds.

(7) Only available as top mounted at 600V unless MCC is Device Limited Arc Shield.

(8) TRUG supports the -755 option at 2000 A, 2500 A, and 3000 A. At 2500 A and 3000 A, depth changes from 15" to 20".

(9) Value shown is max setting of trip unit. Trip unit is electronic, adjustable by 4% (T_ _) or 2.5% (T _ _ G) increments to 40…100% of maximum value selected.

(10) Value shown is max setting of trip unit. Trip unit is electronic, adjustable by 2% increments to 40…100% of maximum value selected.

(11) Value shown is max setting of trip unit. Trip unit is electronic, adjustable by 2.5% increments to 40…100% of maximum value selected.

(12) 100% rated requires 20" deep enclosure.

(13) The catalog numbers listed are not complete:
- Select the trip current from Table 68 (for example, 2193F-AKC-**40**TGM).
- If optional load lugs will be selected, select and price from Table 69 (for example, 2193F-AKC-40TGM-**80A350**).

Bulletin 2193M 3-Pole Main Circuit Breaker (MCB), continued

- CENTERLINE 2100 motor control centers are rated for use with 75 °C wire. Wire must be sized using the 75 °C column in NEC/UL/C-UL. The actual temperature rating of the lug is not relevant.
- Top- and bottom-mounted mains are designed with adequate space to route cables to lugs. Special consideration may need to be given to the mounting of the CTs for a metering device. Consider the addition of a pull box.
- Refer to Appendix for wire size conversion table.

Table 71 - Trip Current

Trip Current (Amperes)	Number	Trip Current (Amperes)	Number
15	30	225	45
20	31	250	46
25	61	300	48
30	32	400	50
40	34	600	52
50	35	800	54
60	36	1000	55
70	37	1200	56
80	38	1600	58
90	39	2000	60
100	40	2500	64
125	41	3000	65
150	42		
175	43		
200	44		

Table 72 - Mechanical and Crimp Lugs for Mains[1]

Frame Type	Rating (Amperes)	Trip Current (Amperes)	Cables/ Phase	Cable/Wire Size Range	Wire Type	Option Number[3]
Mechanical Lugs						
TGM	125	15…125	1	#14…1/0 AWG	CU	
THM, THX, THML, THXL	125	15…125	1	#14…1/0 AWG	CU	
TJM, TJX, TJU, TJML, TJXL, TJUL	250	70…250	1	#10…250 kcmil	CU	
				#14…1/0 AWG	CU/AL	80A1X0
				#14…350 kcmil	CU/AL	80A350
TKM, TKX, TKU, TK_L, TK_G	400	300	1	250…500 kcmil	CU	
					CU/AL	80A500
		400	2	#2/0…250 kcmil	CU	
					CU/AL	80B250
TMM, TMX, TMN, TM_G	800	600	2	#3/0…350 kcmil	CU	
				250…500 kcmil	CU/AL	80B500
		800	3	#2/0…350 kcmil	CU	
				#2/0…400 kcmil	CU/AL	80C400
TNM, TNX, TNN, TN_G	1200	400…1200	4	#4/0…500 kcmil	CU	
				#4/0…500 kcmil	CU/AL	80D500
TRUG	2000	1000…1600	4	#2…600 kcmil	CU/AL	
		2000	6			
	2500	2500	7			
	3000	3000	8			
Crimp Lugs						
TKM, TKX, TKU, TK_L, TK_G	400	300…400	2	250 kcmil	CU[2]	82B250
		300	1	500 kcmil	CU[2]	82A500
		300…400	2	250 kcmil	CU/AL[2]	83B250
		300	1	500 kcmil	CU/AL[2]	83A500
TMM, TMX, TMN, TM_G	800	600	2		CU[2]	82B500[4]
					CU/AL[2]	83B500[4]
		800	3		CU[2]	82C500[4]
					CU/AL[2]	83C500[4]
TNM, TNX, TNN, TN_G	1200	400…800	3		CU[2]	82C500
					CU/AL[2]	83C500
		600…1200	4		CU[2]	82D500
					CU/AL[2]	83D500
TRUG	2000	1000…2000	6	500 kcmil	CU[2]	82F500
					CU/AL[2]	83F500
	2500	2500	7		CU[2]	82G500
					CU/AL[2]	83G500
	3000	3000	8		CU[2]	82H500
					CU/AL[2]	83H500

(1) Lugs are designed for use with breaker frame. For lug combinations other than those shown, contact the factory.

(2) CU crimp lugs are Panduit type LCC Series. CU/AL crimp lugs are Burndy YA-A Series.

(3) If optional full-rated incoming neutral bus is specified, the quantity and size/type of the lug(s) on neutral lug pad will be the same as the 3-phase lugs. When optional half-rated incoming neutral bus is specified and one or two lugs per phase are specified, one lug is provided on the half-rated neutral riser. When three or four lugs are specified, two lugs are provided. When five or six lugs are specified, three lugs are provided on half-rated neutral riser.

(4) Top entry requires Pull Box to comply with NEC.

Notes:

Lighting and Power Panel Units

Bulletin 2193LE Lighting Panel (LPAN)

Bulletin 2193LE is a frame mounted lighting panel with either a main lug or main circuit breaker. The lighting panels are rated for 100 A or 225 A with up to 42 branch circuits. One, two, and three pole bolt-on branch circuit breakers are available with ratings from 15…100 A.

Catalog Number Explanation - Bulletin 2193LE Lighting Panel (LPAN)

- Frame mounted lighting panel that is designed for field installation
- When ordered as a SC-I Unit, supplied with lighting panel, door, hardware and instructions
- Rated for 100 A or 225 A with a maximum 42 branch circuits
- 1, 2 or 3 pole bolt-on branch circuit breakers are available with ratings from 15…100 A
- Reference page 332 for additional bolt-on breakers

Table 73 -

2193LE	-	A	K	L	1	18	-	00WT	-	30A18
Bulletin Number		Maximum Rating of Main Bus	NEMA Enclosure Type	Type of Main	System Phases	1-Pole Branch Breakers Positions		Main Breaker Trip Rating and Type Rating		Branch Breakers

Code	Type
2193LE	Lightning Panels with Bolt-on Branch Breakers (LPAN)

Code	Max. Rating of Main Bus
A	100A
C	225A

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Type of Main
L	Main Lug Only
B	Main Circuit Breaker

Code	System Phases
1	Single Phase
3	Three Phase

Code	1-Pole Branch Breakers Positions
15	15
16	16
18	18
27	27
30	30
42	42

Code	Main Breaker Trip Rating and Type Rating
00WT	Lug Only
40WT	100 A
45WT	225 A

Code	Branch Breakers
See Factory - Installed Bolt-On Branch Breaker table on Page 109	

Bulletin 2193LE Frame Mounted Lighting Panel for Bolt-on Branch Circuit Breakers (LPAN)

- See page 107 for product description.
- Basic configuration includes door with T-handles and support pan.
- Units are NOT wired. Units have NO plug-in stabs.
- Load terminal blocks are NOT furnished.
- Lighting panel bus is aluminum with tin plating. Directory card is supplied.

Table 74 -

Type	Panel Bus and Main Lug Ampere Rating	Max. Number of 1-pole Circuit Breakers	Space Factor	Catalog Number Wiring Type A—Class I(2)		Delivery Program
				NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
WITH MAIN LUG ONLY (MLO)						
Single Phase 3-wire 120/240V AC 10 kA IC rms Sym.	100	18	2.0	2193LE-AKL118-00WT	2193LE-AJL118-00WT	SC
	225	30	2.5	2193LE-CKL130-00WT	2193LE-CJL130-00WT	
		42	3.0	2193LE-CKL142-00WT	2193LE-CJL142-00WT	
Three Phase 4-wire 120/208V AC 10kA IC rms Sym.	100	18	2.0	2193LE-AKL318-00WT	2193LE-AJL318-00WT	
		30	2.5	2193LE-AKL330-00WT	2193LE-AJL330-00WT	
	225	42	3.0	2193LE-CKL342-00WT	2193LE-CJL342-00WT	
WITH MAIN CIRCUIT BREAKER (MCB) (1) 100 A Main Circuit Breaker is Cutler-Hammer BAB type series rating 10 kA. 225 A Main Circuit Breaker is Cutler-Hammer ED type series rating 65 kA.						
Single Phase 3-wire 120/240V AC.	100 (1)	16	2.0	2193LE-AKB116-40WT	2193LE-AJB116-40WT	SC
	225	30	3.5	2193LE-CKB130-45WT	2193LE-CJB130-45WT	
		42	4.0	2193LE-CKB142-45WT	2193LE-CJB142-45WT	
Three Phase 4-wre 120/208V AC.	100 (1)	15	2.0	2193LE-AKB315-40WT	2193LE-AJB315-40WT	
		27	2.5	2193LE-AKB327-40WT	2193LE-AJB327-40WT	
	225	42	4.0	2193LE-CKB342-45WT	2193LE-CJB342-45WT	

(1) The 100 A main circuit breaker in a 100A lighting panel is a reverse-fed branch lighting panel circuit breaker.

(2) Catalog numbers do not include branch breakers. Refer to Factory-installed Bolt-on Branch Circuit Breakers table below for catalog string numbers.

Table 75 - Factory-installed Bolt-on Branch Circuit Breakers (1)

1-pole Thermal Magnetic 120V AC Circuit Breaker 10 kA IC Sym		2-pole Thermal Magnetic 120/240V AC Circuit Breaker 10 kA IC Sym		3-pole Thermal Magnetic 120/240V AC Circuit Breaker 10 kA IC Sym (for use on three phase lighting panels only)	
Trip Rating @ 40°C (Amperes)	Catalog String Number (3)	Trip Rating @ 40°C (Amperes)	Catalog String Number (3)	Trip Rating @ 40°C (Amperes)	Catalog String Number (3)
15 A	30A___	15 A	30B___	15 A	30C___
20 A	31A___	20 A	31B___	20 A	31C___
30 A	32A___	30 A	32B___	30 A	32C___
15 A w/ grd flt (2)	30D___	50 A	35B___	50 A	35C___
20 A w/ grd flt (2)	31D___	100 A	40B___	100 A	40C___
Filler Plate	00A___	—	—	—	—

(1) Refer to page 332 for catalog numbers for field installed branch breakers. When breakers are to be factory-installed, specify filler plates for all remaining blank spaces in panel.
(2) Ground fault interrupting circuit breakers provide 5mA personnel protection.
(3) The catalog numbers listed are not complete:
- Select the number of branch breakers and add two digits to specify the number desired to the circuit breaker catalog number (for example,32A18). Two digits are required for quantities less than ten (for example, 30A03).
- When selecting multiple branch breakers with different trip ratings, add additional string numbers to the end of the catalog number (for example, 2193LE-AK318-00WT-32A18-30A03-30C02).
- Locations of the branch breakers are determined by the factory.
- The maximum amperes connected to any one connector cannot exceed 200 A on bolt-on branch breakers. All branch breakers are Type BAB.

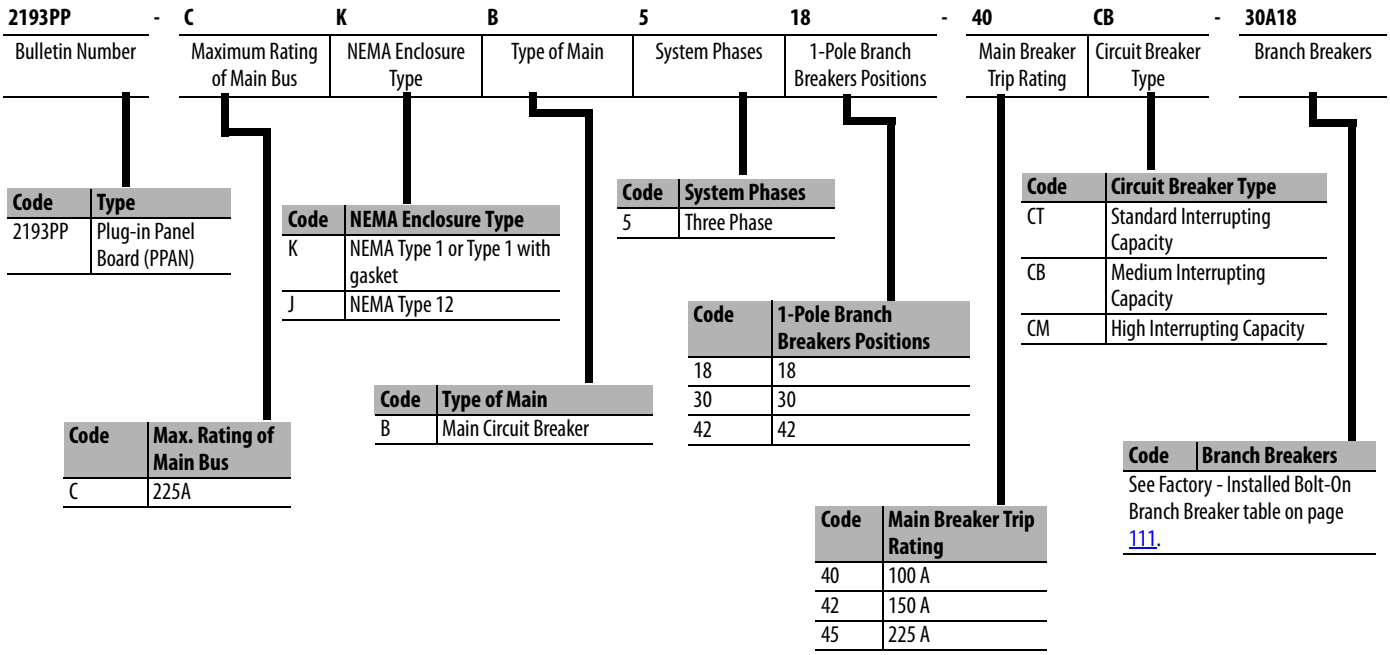
Bulletin 2193PP Panel Board with Main Circuit Breaker (PPAN)

Bulletin 2193PP is a plug-in unit panel board with main circuit breaker. The panel boards are rated for 100 A, 150 A, or 225 A with up to 42 branch circuits. One, two, and three pole bolt-on branch circuit breakers are available with ratings from 15 A to 100 A.

Catalog Number Explanation - Bulletin 2193PP Panel Board with Main Circuit Breaker (PPAN)

- Plug-in unit panel board
- Rated for 100 A, 150 A, or 225 A with up to 42 branch circuits
- 1, 2 or 3 pole bolt-on branch circuit breakers available with ratings from 15…100 A
- Reference page 332 for additional bolt-on breakers

Table 76 -


2193PP - C K B 5 18 - 40 CB - 30A18
Bulletin Number
Maximum Rating of Main Bus
NEMA Enclosure Type
Type of Main
System Phases
1-Pole Branch Breakers Positions
Main Breaker Trip Rating
Circuit Breaker Type
Branch Breakers
Code Type
2193PP Plug-in Panel Board (PPAN)
Code NEMA Enclosure Type
K NEMA Type 1 or Type 1 with gasket
J NEMA Type 12
Code System Phases
5 Three Phase
Code 1-Pole Branch Breakers Positions
18 18
30 30
42 42
Code Circuit Breaker Type
CT Standard Interrupting Capacity
CB Medium Interrupting Capacity
CM High Interrupting Capacity
Code Max. Rating of Main Bus
C 225A
Code Type of Main
B Main Circuit Breaker
Code Main Breaker Trip Rating
40 100 A
42 150 A
45 225 A
Code Branch Breakers
See Factory - Installed Bolt-On Branch Breaker table on page 111.

Bulletin 2193PP Plug-in Panel Board with Main Circuit Breaker (PPAN)

- See page 109 for product description.
- Basic configuration includes door with T-handles, unit support pan, panel board neutral and panel board ground bus.
- Unit plugs into the MCC vertical bus.
- The panel board bus is aluminum with tin plating.
- **The panel board is series rated.** The interrupting capacity rating shown can be applied to all branch circuit breakers.
- Bulletin 2193PP panel board is suitable for use with 3-phase, 4-wire, solidly grounded, Wye systems rated 480Y/277V or less. Can also be used on solidly grounded 3-wire power systems, however, only 2-pole and 3-pole branch circuit breakers can be used.

TIP Neutral and ground bar in Bulletin 2193PP is not factory connected to any neutral bus, neutral plate, or ground bus.

Table 77 -

Main Breaker Trip Rating (Amperes)	Max. Number of 1-pole Circuit Breakers	Main Circuit Breaker Type	Space Factor	IC Rating at 480Y/277V (rms Sym.) (This rating can be applied to all branch circuit breakers.)	Catalog Number (3) Wiring Type A—Class I		Delivery Program
					NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
WITH MAIN CIRCUIT BREAKER (MCB)							
100	18	I3C	2.5	25 kA	2193PP-CKB518-40CB-___	2193PP-CJB518-40CB-___	PE
		I6C		65 kA	2193PP-CKB518-40CM-___	2193PP-CJB518-40CM-___	
		I0C		100 kA	2193PP-CKB518-40CX-___	2193PP-CJB518-40CX-___	
150	30	I3C	3.0	25 kA	2193PP-CKB530-42CB-___	2193PP-CJB530-42CB-___	
		I6C		65 kA	2193PP-CKB530-42CM-___	2193PP-CJB530-42CM-___	
		I0C		100 kA	2193PP-CKB530-42CX-___	2193PP-CJB530-42CX-___	
	42	I3C	3.5	25 kA	2193PP-CKB542-42CB-___	2193PP-CJB542-42CB-___	
		I6C		65 kA	2193PP-CKB542-42CM-___	2193PP-CJB542-42CM-___	
		I0C		100 kA	2193PP-CKB542-42CX-___	2193PP-CJB542-42CX-___	
225	18	JD3D(1)	3.5	35 kA(2)	2193PP-CKB518-45CT-___	2193PP-CJB518-45CT-___	
	30		3.5	35 kA(2)	2193PP-CKB530-45CT-___	2193PP-CJB530-45CT-___	
	42		4.0	35 kA(2)	2193PP-CKB542-45CT-___	2193PP-CJB542-45CT-___	

(1) Non-interchangeable trip breakers.

(2) 35kA series combination rating only when used with 50 A or lower rated branch circuit breakers. Series combination rating is 22kA when used with branch circuit breakers rated 60 A or higher.

(3) The catalog numbers listed are not complete:

- Select the appropriate catalog string number from Factory-Installed Bolt-on Branch Breaker table below to identify the branch breaker trip rating (for example, 32A_).
- Add two digits to specify the number of branch breakers desired. Two digits are also required for quantities less than ten (for example, 03 for quantity three—2193PP-CKB530-42CX-32A**03**).
- When selecting multiple branch breakers with different trip ratings, add additional string numbers to the end of the catalog number (for example, 2193PP-CKB518-40CB-**30A08-31B02-30C02**).
- Locations of the branch breakers are determined by the factory.

Table 78 - Factory-Installed Bolt-on Branch Breaker (1)

1-Pole Inverse Time (Thermal Magnetic) 277V AC Circuit Breaker 14 kA I.C. SYM		2-Pole Inverse Time (Thermal Magnetic) 480Y/277V AC Circuit Breaker 14 kA I.C. SYM		3-Pole Inverse Time (Thermal Magnetic) 480Y/277V AC Circuit Breaker 14 kA I.C. SYM		Delivery Program
Trip Rating @ 40°C (Amperes)	Catalog String Number	Trip Rating @ 40°C (Amperes)	Catalog String Number	Trip Rating @ 40 °C (Amperes)	Catalog String Number	
15	30A___	15	30B___	15	30C___	PE
20	31A___	20	31B___	20	31C___	
25	61A___	25	61B___	25	61C___	
30	32A___	30	32B___	30	32C___	
35	33A___	35	33B___	35	33C___	
40	34A___	40	34B___	40	34C___	
50	35A___	50	35B___	50	35C___	
60	36A___	60	36B___	60	36C___	
70	37A___	70	37B___	70	37C___	
80	38A___	80	38B___	80	38C___	
90	39A___	90	39B___	90	39C___	
100	40A___	100	40B___	100	40C___	
Filler Plate	00A___	—	—	—	—	SC

(1) All branch breakers are Type GHB. Refer to page 332 for catalog number of field installed branch breakers. Specify filler plates for all blank spaces in panel. The maximum amperes connected to any one connector cannot exceed 200 A. The 14 kA interrupting capacity rating applies to the individual branch breaker. When used in the 2193PP, the I.C. rating of the main breaker can be applied to all branch breakers.

Transformer Units

Bulletin 2195, 2196, 2197 Control and Lighting Transformers (XFMR)

Bulletins 2195, 2196, and 2197 are control and lighting transformer units. The transformer units are available with ratings from 0.5 kVA through 50 kVA for single-phase and 10 kVA through 45 kVA for three-phase. Secondary fuses are provided with each transformer unit. Factory installed primary fusing is optional on the 2196 transformer unit.

Catalog Number Explanation - Bulletin 2195, 2196 and 2197 Transformer Units

- Control and lighting transformers
- Rated from 0.5…50 kVA, single-phase and 10…45 kVA, three-phase
- Secondary protection provided

Table 79 -

Bulletin Number	Transformer Size	NEMA Enclosure Type	Line Voltage	Fuse, Clip Rating and Class or Circuit Breaker Trip and Type	Options
2195 -	A	K	BD -		- **
2196 -	A	K	BD -	24J	- **
2197 -	A	K	BD -	30TGM	- **

Code	Type
2195	Control and Lighting Transformer without Disconnecting Means (XFMR)
2196(Z)	Control and Lighting Transformer with Fusible Disconnect (XFMR)
2197(Z)	Control and Lighting Transformer with Circuit Breaker (XFMR)

Note: The (Z) denotes that the disconnect portion of the unit is 0.5 space factor.

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Fuse, Clip Rating and Class or Circuit Breaker Trip and Type
2195	Not Applicable
2196	'24J' Fuse Clip Rating and Class. See table on page 319
2197	'30TGM' Circuit Breaker Trip and Type. See table on page 319 and 321

Code	Transformer Size
Single Phase	
A	0.5 kVA
B	0.75 kVA
C	1.0 kVA
Z	1.6 kVA
E	2.0 kVA
F	3.0 kVA
G	5.0 kVA
H	7.5 kVA
J	10 kVA
K	15 kVA
M	25 kVA
X	37.5 kVA
Y	50 kVA
Three Phase	
P	10 kVA
Q	15 kVA
S	25 kVA
T	30 kVA
V	37.5 kVA
W	45 kVA

Line Voltage		
Single Phase		
Code	Primary	Secondary
AD	240 V	120 V, (1) Fuse
BD	480 V0 V	120 V, (1) Fuse
CD	600 V	120 V, (1) Fuse
AA	240 V	240/120 V, (2) Fuses
BA	480 V	240/120 V, (2) Fuses
CA	600 V	240/120 V, (2) Fuses
NS	380 V	110/115 V, (1) 1-pole CB
KNS	400 V	110/115 V, (1) 1-pole CB
IS	415 V	110/115 V, (1) 1-pole CB
NP	380 V	110 V, (2) 1-pole CB
KNP	400 V	115 V, (2) 1-pole CB
IP	415 V	220 V, (2) 1-pole CB
IT	415 V	240 V, (2) 1-pole CB
Three Phase		
Code	Primary	Secondary
AH	240 V	208/120 V, (3) Fuses
BH	480 V	208/120 V, (3) Fuses
CH	600 V	208/120 V, (3) Fuses

Code	Options
See Options Section beginning on page 145	

Bulletin 2195 Control and Lighting Transformer Unit without Disconnecting Means (XFMR)

See page 113 for product description.

TIP

- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- To address the heating effects from loads containing a high degree of harmonic content, it can be necessary to oversize the field conductors (especially neutrals), use k-factor lighting transformers, and oversize the lighting contactor units (increase by 50%). Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.
- Tap arrangement for 15…50 kVA single phase transformers is two 2-1/2% Taps FCAN, four 2-1/2% Taps FCBN. Tap arrangements for 10…45 kVA three phase transformers is two 2-1/ 2% Taps FCBN.
- Transformers with 7.5 kVA rating and larger have Class 180 °C, 80 °C rise.

For 71" high sections, see restrictions on page 32.

Table 80 -

Rating kVA (1)	Recommended Primary Protection (Amperes)			Space Factor	Catalog Number (4) Wiring Type A—Class I			Delivery Program
	240 V	480 V	600 V		NEMA Type 1 and Type 1 w/ gasket(5)	NEMA Type 1 with filters and Type 1 w/ gasket and filters (6)	NEMA Type 12 (1)	
SINGLE PHASE—120 Volt secondary with one secondary fuse								
0.5	15	15	15	1.0	2195-AK_D	—	2195-AJ_D	(7)
0.75					2195-BK_D	—	2195-BJ_D	
1				1.5	2195-CK_D	—	2195-CJ_D	
1.6				2.0	2195-ZK_D	—	2195-ZJ_D	
2					2195-EK_D	—	2195-EJ_D	
3 (1.5)				1.5 (2)	2195-FK_D	2195-FK_D-16A	2195-FJ_D	(8)
5 (2.5)	—	—		1.5 (2)	2195-GK_D	2195-GK_D-16A	2195-GJ_D	
SINGLE PHASE—120/240 Volt secondary with two secondary fuses Transformer secondary wired and protected for 240 V phase to phase/120 V phase to center tap neutral.								
5 (2.5)	30	15	—	1.5 (2)	2195-GK_A	2195-GK_A-16A	2195-GJ_A	(8)
7.5 (3.7)	40	20	20		2195-HK_A	2195-HK_A-16A	2195-HJ_A	
10 (5)	50	30	20		2195-JK_A	2195-JK_A-16A	2195-JJ_A	
15 (7.5)	70	40	30	2.0 (3)	2195-KK_A	2195-KK_A-16A	2195-KJ_A	
25 (12.5)	125	70	60		2195-MK_A	2195-MK_A-16A	2195-MJ_A	
37.5 (18.5)	200	100	70	2.0 20" D (3)	2195-XK_A	2195-XK_A-16A	2195-XJ_A	
50 (25)	300	150	100		2195-YK_A	2195-YK_A-16A	2195-YJ_A	

Table is continued on the next page.

Table 80 -

Rating kVA [1]	Recommended Primary Protection (Amperes)			Space Factor	Catalog Number [4] Wiring Type A—Class I			Delivery Program
	240 V	480 V	600 V		NEMA Type 1 and Type 1 w/ gasket [5]	NEMA Type 1 with filters and Type 1 w/ gasket and filters [6]	NEMA Type 12 [1]	
THREE PHASE—120/208 Volt secondary with three secondary fuses Transformer secondary wired and protected for 208 V phase to phase/120 V phase to WYE neutral.								
10 (5)	—	20	15	2.0 [3]	2195-PK_H	2195-PK_H-16A	2195-PJ_H	[8]
15 (7.5)	—	20	15		2195-QK_H	2195-QK_H-16A	2195-QJ_H	
25 (12.5)	—	40	30		2195-SK_H	2195-SK_H-16A	2195-SJ_H	
30 (15)	—	50	40		2195-TK_H	2195-TK_H-16A	2195-TJ_H	
37.5 (18.5)	—	60	50	2.0 20″ D [3]	2195-VK_H	2195-VK_H-16A	2195-VJ_H	
45 (22.5)	—	70	60		2195-WK_H	2195-WK_H-16A	2195-WJ_H	

(1) In NEMA Type 12 applications (non-ventilated 3 kVA and larger transformers), to maximize the transformer's life, we recommend that the transformer not be loaded to greater than 50% of its nameplate rating. Number in parentheses indicates approximate derated rating. However, in many applications, NEMA Type 1 with gasket design (vented and filtered doors) can be sufficient.

(2) Frame mounted unit. Must be located at bottom of section.

(3) Frame mounted unit, section does not have vertical wireway next to this unit. Must be located at bottom of section.

(4) The catalog numbers listed are not complete. Select the primary voltage code from table on page 313 to identify the transformer primary voltage desired (for example, 2195-FK**B**D).

(5) For ratings 3 kVA and larger, vented door is provided.

(6) For ratings 3 kVA and larger, vented and filtered door is provided. 3 kVA and larger are available on NEMA Type 12 structures but unit still is NEMA Type 1/1G with gasket and filters. See page 157 for option -16A.

(7) 240V and 480V are SC in U.S. and Canada. 600V is PE in U.S. and SC in Canada.

(8) 240V and 480V are SC-II in U.S. and Canada. 600V is PE-II in U.S. and SC-II in Canada.

Bulletin 2195 Control and Lighting Transformer Unit without Disconnecting Means (XFMR), continued

See page 113 for product description.

TIP

- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- To address the heating effects from loads containing a high degree of harmonic content, it can be necessary to oversize the field conductors (especially neutrals), use k-factor lighting transformers, and oversize the lighting contactor units (increase by 50%). Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.
- Transformers with 7.5 kVA rating and larger have Class 180 °C, 80 °C rise.

For 71" high sections, see restrictions on page 32.

Table 81 -

Rating kVA (1)	Recommended Primary Protection (Amperes)			Space Factor	Catalog Number Wiring Type A—Class I			Delivery Program
	380 V	400 V	415 V		NEMA Type 1 and Type 1 w/ gasket (7)	NEMA Type 1 with filters and Type 1 w/ gasket and filters (9)	NEMA Type 12 (1)	
SINGLE PHASE—110/115 Volt secondary with one 1-pole circuit breaker (2)								
0.5 (2)	15	15	15	1.0	2195-AK_S (8)	—	2195-AJ_S (8)	PE
0.75 (2)					2195-BK_S (8)	—	2195-BJ_S (8)	
1 (2)				1.5	2195-CK_S (8)	—	2195-CJ_S (8)	
1.6 (2)				2.0	2195-ZK_S (8)	—	2195-ZJ_S (8)	
2 (2)					2195-EK_S (8)	—	2195-EJ_S (8)	
3 (2) (1.5)				1.5 (5)	2195-FK_S (8)	2195-FK_S-16A (8)	2195-FJ_S (8)	PE-II
SINGLE PHASE—110/220, Volt secondary with two 1-pole circuit breakers Transformer secondary wired and protected for 220V phase-to-phase, 110V phase-to-center tap neutral.								
5 (2.5) (2)	20	—	—	1.5 (5)	2195-GKNP	2195-GKNP-16A	2195-GJNP	PE-II
7.5 (3.7) (2)	20	—	—		2195-HKNP	2195-HKNP-16A	2195-HJNP	
10 (5) (2)	30	—	—		2195-JKNP	2195-JKNP-16A	2195-JJNP	
15 (7.5)	50	—	—	2.0 (6)	2195-KKNP	2195-KKNP-16A	2195-KJNP	
SINGLE PHASE—115/230 Volt secondary with two 1-pole circuit breakers Transformer secondary wired and protected for 230V phase-to-phase, 115V phase-to-center tap neutral.								
5 (2.5)	—	20	—	1.5 (5)	2195-GKKNP	2195-GKKNP-16A	2195-GJKNP	PE-II
7.5 (3.7)	—	20	—		2195-HKKNP	2195-HKKNP-16A	2195-HJKNP	
10 (5)	—	30	—		2195-JKKNP	2195-JKKNP-16A	2195-JJKNP	

Table is continued on the next page.

Table 81 -

Rating kVA [1]	Recommended Primary Protection (Amperes)			Space Factor	Catalog Number Wiring Type A—Class I			Delivery Program
	380 V	400 V	415 V		NEMA Type 1 and Type 1 w/ gasket [7]	NEMA Type 1 with filters and Type 1 w/ gasket and filters [9]	NEMA Type 12 [1]	
SINGLE PHASE— 120/240 Volt secondary with two 1-pole circuit breakers [3] Transformer secondary wired and protected for 240V phase-to-phase, 120V phase-to-center tap neutral.								
5 (2.5) [2]	—	—	20	1.5 [5]	2195-GKIT	2195-GKIT-16A	2195-GJIT	PE-II
7.5 (3.7) [2]	—	—	20		2195-HKIT	2195-HKIT-16A	2195-HJIT	
10 (5) [2]	—	—	30		2195-JKIT	2195-JKIT-16A	2195-JJIT	
15 (7.5) [4]	—	—	50	2.0 [6]	2195-KKIP	2195-KKIP-16A	2195-KJIP	

(1) In NEMA Type 12 applications (non-ventilated 3 kVA and larger transformers), to maximize the transformer's life, it is recommended that the transformer not be loaded to greater than 50% of its nameplate rating. Number in parentheses indicates approximate derated rating. However, in many applications, NEMA Type 1 with gasket design (vented and filtered doors) can be sufficient.

(2) Incorporates primary taps for future conversion to new global IEC voltage standards (for example, 400V/115V/230V). Allows conversion without the need to replace transformers.

(3) The 15k VA transformer has 110/220V secondary with two 1-pole circuit breakers.

(4) Tap arrangement is two 2-1/2% Taps FCAN, four 2-1/2% Taps FCBN.

(5) Frame mounted unit. Must be located at bottom of section.

(6) Frame mounted unit, section does not have vertical wireway next to this unit. Must be located at bottom of section.

(7) For ratings 3 kVA and larger, vented door is provided.

(8) The catalog numbers listed are not complete. Select the primary voltage code from table on page 313 to identify the transformer primary voltage desired (for example, 2195-FK**N**S).

(9) For ratings 3 kVA and larger, vented and filtered door is provided. 3 kVA and larger are available on NEMA Type 12 structures but unit still will be NEMA Type 1/1G with gasket and filters. See page 157 for option -16A.

Bulletin 2196 Control and Lighting Transformer Unit with Fusible Disconnect Switch (XFMR)

See page 113 for product description.

TIP

- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- To address the heating effects from loads containing a high degree of harmonic content, it can be necessary to oversize the field conductors (especially neutrals), use k-factor lighting transformers, and oversize the lighting contactor units (increase by 50%). Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.
- Transformers with 7.5 kVA rating and larger have Class 180 °C, 80 °C rise.
- Tap arrangement for 15…50 kVA single phase transformers is two 2-1/2% Taps FCAN, four 2-1/2% Taps FCBN.
  Tap arrangements for 10…45 kVA three phase transformers is two 2-1/ 2% Taps FCBN.
- 3…50 kVA consists of two compartments—a fusible disconnect compartment and a transformer compartment wired and interlocked together.

For 71″ high sections, see restrictions on page 32.

Table 82 -

Rating kVA (1)	Fuse Clip Rating (Amperes)			Space Factor	Catalog Number (6) Wiring Type A—Class I			Delivery Program
	240 V	480 V	600 V		NEMA Type 1 and Type 1 w/ gasket (7)	NEMA Type 1 with filters and Type 1 w/ gasket and filters (8)	NEMA Type 12 (1)	
SINGLE PHASE—120 Volt secondary with one secondary fuse								
0.5	30	30	30	1.0	2196-AK_D-___	—	2196-AJ_D-___	(9)
0.75					2196-BK_D-___	—	2196-BJ_D-___	
1				1.5	2196-CK_D-___	—	2196-CJ_D-___	
1.6				2.0	2196-ZK_D-___	—	2196-ZJ_D-___	
2					2196-EK_D-___	—	2196-EJ_D-___	
3 (1.5)				2.5 (2)	2196-FK_D-___	2196-FK_D-___-16A	2196-FJ_D-___	(10)
5 (2.5)	—	—	30	2.5 (2)	2196-GK_D-___	2196-GK_D-___-16A	2196-GJ_D-___	
SINGLE PHASE—120/240 Volt secondary with two secondary fuses Transformer secondary wired and protected for 240V phase to phase/120V phase to center tap neutral.								
5 (2.5)	30	30	—	2.5 (2)	2196-GK_A-___	2196-GK_A-___-16A	2196-GJ_A-___	(10)
7.5 (3.7)	60	30	30		2196-HK_A-___	2196-HK_A-___-16A	2196-HJ_A-___	
10 (5)	60	30	30		2196-JK_A-___	2196-JK_A-___-16A	2196-JJ_A-___	
15 (7.5)	100	60	60	3.0 (3),(4)	2196-KK_A-___	2196-KK_A-___-16A	2196-KJ_A-___	
25 (12.5)	200	60	60	3.0 (3),(4)	2196-MK_A-___	2196-MK_A-___-16A	2196-MJ_A-___	
37.5 (18.5)	200	100	100	3.5 20″ D (3),(4)	2196-XK_A-___	2196-XK_A-___-16A	2196-XJ_A-___	
50 (25)	—	200	100	3.5, 20″ D (4),(5)	2196-YK_A-___	2196-YK_A-___-16A	2196-YJ_A-___	

Table is continued on the next page.

Table 82 -

Rating kVA [1]	Fuse Clip Rating (Amperes)			Space Factor	Catalog Number [6] Wiring Type A—Class I			Delivery Program
	240 V	480 V	600 V		NEMA Type 1 and Type 1 w/ gasket [7]	NEMA Type 1 with filters and Type 1 w/ gasket and filters [8]	NEMA Type 12 [1]	
THREE PHASE—120/208 Volt secondary with three secondary fuses Transformer secondary wired and protected for 280V phase to phase/120V phase to WYE neutral.								
10 (5)	—	30	30	3.0 [4]	2196-PK_H-___	2196-PK_H-___-16A	2196-PJ_H-___	[10]
15 (7.5)	—	30	30		2196-QK_H-___	2196-QK_H-___-16A	2196-QJ_H-___	
25 (12.5)	—	60	60		2196-SK_H-___	2196-SK_H-___-16A	2196-SJ_H-___	
30 (15)	—	60	60		2196-TK_H-___	2196-TK_H-___-16A	2196-TJ_H-___	
37.5 (18.5)	—	60	60	3.0 20″ D [4]	2196-VK_H-___	2196-VK_H-___-16A	2196-VJ_H-___	
45 (22.5)	—	100	60	3.0 20″ D [4],[5]	2196-WK_H-___	2196-WK_H-___-16A	2196-WJ_H-___	

(1) In NEMA Type 12 applications (non-ventilated 3 kVA and larger transformers), to maximize the transformer's life, it is recommended that the transformer not be loaded to greater than 50% of its nameplate rating. Number in parentheses indicates approximate derated rating. However, in many applications, NEMA Type 1 with gasket design (vented and filtered doors) can be sufficient.
(2) Frame mounted unit. Must be located at bottom of section.
(3) For transformers with 240V primary, add 0.5 space factor.
(4) Frame mounted unit, section does not have vertical wireway next to this unit. Must be located at bottom of section.
(5) For transformers with 480V primary, add 0.5 space factor.
(6) The catalog numbers listed are not complete.
- Select the voltage code from table on page 313 (for example, 2196-FK**B**D).
- If power fuse is NOT selected, select fuse clip designator from table on page 318 (for example, 2196-FKBD-**24J**).
- If power fuse IS selected, select the fuse clip designator AND the manufacturer from table on page 318 (for example, 2196-FKBD-**24JG**).
- For fuse rating, based on transformer rating, see publication 2100-TD003.

(7) For ratings 3 kVA and larger, vented door is provided.
(8) For ratings 3 kVA and larger, vented and filtered door is provided. 3kVA and larger are available on NEMA Type 12 structures but unit still will be NEMA Type 1/1G with gasket and filters. See page 157 for option -16A.
(9) 240V and 480V are SC in U.S. and Canada. 600 V is PE in U.S. and SC in Canada.
(10) 240 V and 480V are SC-II in U.S. and PE-II in Canada. 600V is PE-II in U.S. and SC-II in Canada.

Bulletin 2196Z Control and Lighting Transformer Unit with Fusible Disconnect Switch (XFMR)

TIP The (Z) denotes that the disconnect portion of the unit is 0.5 space factor.

See page 113 for product description.

TIP
- Do not mount transformer units below drive units. Heat from transformer units may cause drive to trip.
- To address the heating effects from loads containing a high degree of harmonic content, it can be necessary to oversize the field conductors (especially neutrals), use k-factor lighting transformers, and oversize the lighting contactor units (increase by 50%). Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.
- Tap arrangement for 15…50 kVA single phase transformers is two 2-1/2% Taps FCAN, four2-1/2% Taps FCBN.
  Tap arrangements for 10…45 kVA three phase transformers is two 2 1/ 2% Taps FCBN.
- Transformers with 7.5 kVA rating and larger have Class 180 °C, 80 °C rise.
- Unit consists of two compartments—a fusible disconnect compartment and a transformer compartment wired and interlocked together. The fusible disconnect compartment has a horizontal operating handle.

For 71″ high sections, see restrictions on page 32.

Table 83 -

Rating kVA [1]	Fuse Clip Rating (Amperes)			Space Factor	Catalog Number [4] Wiring Type A—Class I			Delivery Program
	240 V	480 V	600 V		NEMA Type 1 and Type 1 w/ gasket [5]	NEMA Type 1 with filters and Type 1 w/ gasket and filters [6]	NEMA Type 12 [1]	
SINGLE PHASE—120 Volt secondary with one secondary fuse								
3 (1.5)	30	30	30	2.0 [2]	2196Z-FK_D-___	2196Z-FK_D-___-16A	2196Z-FJ_D-___	[7]
5 (2.5)	—	—	30	2.0 [2]	2196Z-GK_D-___	2196Z-GK_D-___-16A	2196Z-GJ_D-___	
SINGLE PHASE—120/240 Volt secondary with two secondary fuses Transformer secondary wired and protected for 240 V phase to phase/120 V phase to center tap neutral.								
5 (2.5)	30	30	—	2.0 [2]	2196Z-GK_A-___	2196Z-GK_A-___-16A	2196Z-GJ_A-___	[7]
7.5 (3.7)	—	30	30		2196Z-HK_A-___	2196Z-HK_A-___-16A	2196Z-HJ_A-___	
10 (5)	—	30	30		2196Z-JK_A-___	2196Z-JK_A-___-16A	2196Z-JJ_A-___	
THREE PHASE—120/208 Volt secondary with three secondary fuses Transformer secondary wired and protected for 280 V phase to phase/120 V phase to WYE neutral.								
10 (5)	—	30	30	2.5 [3]	2196Z-PK_H-___	2196Z-PK_H-___-16A	2196Z-PJ_H-___	[7]
15 (7.5)	—	30	30		2196Z-QK_H-___	2196Z-QK_H-___-16A	2196Z-QJ_H-___	

(1) In NEMA Type 12 applications (non-ventilated 3 kVA and larger transformers), to maximize the transformer's life, it is recommended that the transformer not be loaded to greater than 50% of its nameplate rating. Number in parentheses indicates approximate derated rating. However, in many applications, NEMA Type 1 with gasket design (vented and filtered doors) may be sufficient.

(2) Frame mounted unit. Must be located at bottom of section.

(3) Frame mounted unit, section does not have vertical wireway next to this unit. Must be located at bottom of section.

(4) The catalog numbers listed are not complete.
- Select the voltage code from table on page 313 (for example, 2196Z-FK**B**D).
- If power fuse is NOT selected, select fuse clip designator from table on page 318 (for example, 2196Z-FKBD-**24J**).
- If power fuse IS selected, select the fuse clip designator AND the manufacturer from table on page 318 (for example, 2196Z-FKBD-**24JG**).
- For fuse rating, based on transformer rating, see publication 2100-TD003.

(5) For ratings 3 kVA and larger, vented door is provided.

(6) For ratings 3 kVA and larger, vented and filtered door is provided. 3kVA and larger are available on NEMA Type 12 structures but unit is still NEMA Type 1/1G with gasket and filters. See page 157 for option -16A.

(7) 240V and 480V are SC-II in U.S. and PE-II in Canada. 600V is PE-II in U.S. and SC-II in Canada.

Bulletin 2196 Control and Lighting Transformer Unit with Fusible Disconnect Switch (XFMR), continued

See 113 for product description.

TIP

- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- To address the heating effects from loads containing a high degree of harmonic content, it can be necessary to oversize the field conductors (especially neutrals), use k-factor lighting transformers, and oversize the lighting contactor units (increase by 50%). Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.
- Transformers with 7.5 kVA rating and larger have Class 180 °C, 80 °C rise.
- 3…50 kVA consists of two compartments—a fusible disconnect compartment and a transformer compartment wired and interlocked together.

For 71" high sections, see restrictions on page 32.

Table 84 -

Rating kVA (1)	Fuse Clip Rating (Amperes)			Space Factor	Catalog Number (7) Wiring Type A—Class I			Delivery Program
	380 V	400 V	415 V		NEMA Type 1 and Type 1 w/ gasket (8)	NEMA Type 1 with filters and Type 1 w/ gasket and filters (9)	NEMA Type 12 (1)	
SINGLE PHASE—110/115 Volt secondary with one 1-pole circuit breaker (2)								
0.5 (2)	30	30	30	1.0	2196-AK_S-___	—	2196-AJ_S-___	PE
0.75 (2)					2196-BK_S-___	—	2196-BJ_S-___	
1 (2)				1.5	2196-CK_S-___	—	2196-CJ_S-___	
1.6 (2)				2.0	2196-ZK_S-___	—	2196-ZJ_S-___	
2 (2)					2196-EK_S-___	—	2196-EJ_S-___	
3 (1.5) (2)				2.5 (5)	2196-FK_S-___	2196-FK_S-___-16A	2196-FJ_S-___	PE-II
SINGLE PHASE—110/220 Volt secondary with two 1-pole circuit breakers Transformer secondary wired and protected for 220V phase-to-phase, 110V phase-to-center tap neutral.								
5 (2.5) (2)	30	—	—	2.5 (5)	2196-GKNP-___	2196-GKNP-___-16A	2196-GJNP-___	PE-II
7.5 (3.7) (2)	30	—	—		2196-HKNP-___	2196-HKNP-___-16A	2196-HJNP-___	
10 (5) (2)	30	—	—		2196-JKNP-___	2196-JKNP-___-16A	2196-JJNP-___	
15 (7.5) (3)	60	—	—	3.0 (6)	2196-KKNP-___	2196-KKNP-___-16A	2196-KJNP-___	
SINGLE PHASE—115 /230 Volt secondary with two 1-pole circuit breakers Transformer secondary wired and protected for 230V phase-to-phase, 115V phase-to-center tap neutral.								
5 (2.5)	—	30	—	2.5 (5)	2196-GKKNP-___	2196-GKKNP-___-16A	2196-GJKNP-___	PE-II
7.5 (3.7)	—	30	—		2196-HKKNP-___	2196-HKKNP-___-16A	2196-HJKNP-___	
10 (5)	—	30	—		2196-JKKNP-___	2196-JKKNP-___-16A	2196-JJKNP-___	

Table is continued on the next page.

Table 84 -

Rating kVA [1]	Fuse Clip Rating (Amperes)			Space Factor	Catalog Number [7] Wiring Type A—Class I			Delivery Program
	380 V	400 V	415 V		NEMA Type 1 and Type 1 w/ gasket [8]	NEMA Type 1 with filters and Type 1 w/ gasket and filters [9]	NEMA Type 12 [1]	
SINGLE PHASE—120/240 Volt secondary with two 1-pole circuit breakers [4] Transformer secondary wired and protected for 240V phase-to-phase, 120V phase-to-center tap neutral.								
5 (2.5) [2]	—	—	30	2.5 [5]	2196-GKIT-___	2196-GKIT-___-16A	2196-GJIT-___	PE-II
7.5 (3.7) [2]	—	—	30		2196-HKIT-___	2196-HKIT-___-16A	2196-HJIT-___	
10 (5) [2]	—	—	30		2196-JKIT-___	2196-JKIT-___-16A	2196-JJIT-___	
15 (7.5) [3]	—	—	60	3.0 [6]	2196-KKIP-___	2196-KKIP-___-16A	2196-KJIP___	

(1) In NEMA Type 12 applications (non-ventilated 3 kVA and larger transformers), to maximize the transformer's life, we recommend that the transformer not be loaded to greater than 50% of its nameplate rating. Number in parentheses indicates approximate derated rating. However, in many applications, NEMA Type 1 with gasket design (vented and filtered doors) is sufficient.

(2) Incorporates primary taps for future conversion to new global IEC voltage standards (for example, 400 V/115 V/230 V). Allows conversion without the need to replace transformers.

(3) Tap arrangement is two 2-1/2% Taps FCAN, four 2-1/2% Taps FCBN.

(4) The 15 kVA transformer has 110/220V secondary with two 1-pole circuit breakers.

(5) Frame mounted unit. Must be located at bottom of section.

(6) Frame mounted unit, section does not have vertical wireway next to this unit. Must be located at bottom of section.

(7) The catalog numbers listed are not complete:
- Select the voltage code from table on page 313 (for example, 2196-FK**N**S).
- Select the fuse clip designator from table on page 318 for example, 2196-FKNS-**24J**). No power fuses available.

(8) For ratings 3 kVA and larger, vented door is provided.

(9) For ratings 3 kVA and larger, vented door is provided. 3 kVA and larger are available on NEMA Type 12 structures but unit is still NEMA Type 1/1G with gasket and filters. See page 157 for option -16A.

Bulletin 2196Z Control and Lighting Transformer Unit with Fusible Disconnect Switch (XFMR), continued

TIP The (Z) denotes that the disconnect portion of the unit is 0.5 space factor.

See page 113 for product description.

TIP
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- To address the heating effects from loads containing a high degree of harmonic content, it can necessary to oversize the field conductors (especially neutrals), use k-factor lighting transformers, and oversize the lighting contactor units (increase by 50%). Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.
- Transformers with 7.5 kVA rating and larger have Class 180 °C, 80 °C rise.
- Unit consists of two compartments—a fusible disconnect compartment and a transformer compartment wired and interlocked together.The fusible disconnect compartment has a horizontal operating handle.

For 71" high sections, see restrictions on page 32.

Table 85 -

Rating kVA (1)	Fuse Clip Rating (Amperes)			Space Factor	Catalog Number (4) Wiring Type A—Class I			Delivery Program
	380 V	400 V	415 V		NEMA Type 1 and Type 1 w/ gasket (5)	NEMA Type 1 with filters and Type 1 w/ gasket and filters (6)	NEMA Type 12 (1)	
SINGLE PHASE—110/115 Volt secondary with one 1-pole circuit breaker (2)								
3 (1.5) (2)	30	30	30	2.0 (3)	2196Z-FK_S-___	2196Z-FK_S-___-16A	2196Z-FJ_S-___	PE-II
SINGLE PHASE—110/220 Volt secondary with two 1-pole circuit breakers Transformer secondary wired and protected for 220 V phase-to-phase, 110 V phase-to-center tap neutral.								
5 (2.5) (2)	30	—	—	2.0 (5)	2196Z-GKNP-___	2196Z-GKNP-___-16A	2196Z-GJNP-___	PE-II
7.5 (3.7) (2)	30	—	—		2196Z-HKNP-___	2196Z-HKNP-___-16A	2196Z-HJNP-___	
10 (5) (2)	30	—	—		2196Z-JKNP-___	2196Z-JKNP-___-16A	2196Z-JJNP-___	
SINGLE PHASE—115/230 Volt secondary with two 1-pole circuit breakers Transformer secondary wired and protected for 230 V phase-to-phase, 115 V phase-to-center tap neutral.								
5 (2.5)	—	30	—	2.0 (5)	2196Z-GKKNP-___	2196Z-GKKNP-___-16A	2196Z-GJKNP-___	PE-II
7.5 (3.7)	—	30	—		2196Z-HKKNP-___	2196Z-HKKNP-___-16A	2196Z-HJKNP-___	
10 (5)	—	30	—		2196Z-JKKNP-___	2196Z-JKKNP-___-16A	2196Z-JJKNP-___	
SINGLE PHASE—120/240 Volt secondary with two 1-pole circuit breakers Transformer secondary wired and protected for 240 V phase-to-phase, 120 V phase-to-center tap neutral.								
5 (2.5) (2)	—	—	30	2.0 (5)	2196Z-GKIT-___	2196Z-GKIT-___-16A	2196Z-GJIT-___	PE-II
7.5 (3.7) (2)	—	—	30		2196Z-HKIT-___	2196Z-HKIT-___-16A	2196Z-HJIT-___	
10 (5) (2)	—	—	30		2196Z-JKIT-___	2196Z-JKIT-___-16A	2196Z-JJIT-___	

(1) In NEMA Type 12 applications (non-ventilated 3 kVA and larger transformers), to maximize the transformer's life, we recommend that the transformer not be loaded to greater than 50% of its nameplate rating. Number in parentheses indicates approximate derated rating. However, in many applications, NEMA Type 1 with gasket design (vented and filtered doors) is sufficient.

(2) Incorporates primary taps for future conversion to new global IEC voltage standards (for example, 400V/115V/230V). Allows conversion without the need to replace transformers.

(3) Frame mounted unit. Must be located at bottom of section.

(4) The catalog numbers listed are not complete:
- Select the voltage code from table on page 313 (for example, 2196Z-FK**N**S).
- Select the fuse clip designator from table on page 318 (for example, 2196Z-FKNS-**24J**). No power fuses available.

(5) For ratings 3 kVA and larger, vented door is provided.

(6) For ratings 3 kVA and larger, vented door is provided. 3kVA and larger are available on NEMA Type 12 structures but unit is still NEMA Type 1/1G with gasket and filters. See page 157 for option -16A.

Bulletin 2197 Control and Lighting Transformer Unit with Circuit Breaker (XFMR)

See page 113 for product description.

TIP

- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- To address the heating effects from loads containing a high degree of harmonic content, it can be necessary to oversize the field conductors (especially neutrals), use k-factor lighting transformers, and oversize the lighting contactor units (increase by 50%). Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.
- Tap arrangement for 15…50 kVA single phase transformers is two 2-1/2% Taps FCAN, four 2-1/2% Taps FCBN.
  Tap arrangements for 10…45 kVA three phase transformers is two 2 1/ 2% Taps FCBN.
- Transformers with 7.5 kVA rating and larger have Class 180 °C, 80 °C rise.
- 3…50 kVA consists of a circuit breaker compartment and transformer compartment wired and interlocked together.

For 71” high sections, see restrictions on page 32.

Table 86 -

Rating kVA (1)	Size of Primary Protection			Space Factor	Catalog Number (6) Wiring Type A Only—Class I			Delivery Program
	240 V	480 V	600 V		NEMA Type 1 and Type 1 w/ gasket (7)	NEMA Type 1 with filters and Type 1 w/ gasket and filters (8)	NEMA Type 12 (1)	
SINGLE PHASE—120 Volt secondary with one secondary fuse								
0.5	15	15	15 (2)	1.0	2197-AK_D-___	—	2197-AJ_D-___	(9)
0.75					2197-BK_D-___	—	2197-BJ_D-___	
1				1.5	2197-CK_D-___	—	2197-CJ_D-___	
1.6				2.0	2197-ZK_D-___	—	2197-ZJ_D-___	
2					2197-EK_D-___	—	2197-EJ_D-___	
3 (1.5)				2.5 (3)	2197-FK_D-___	2197-FK_D-___-16A	2197-FJ_D-___	(10)
5 (2.5)	—	—	15	2.5 (3)	2197-GK_D-___	2197-GK_D___-16A	2197-GJ_D-___	
SINGLE PHASE—120/240 Volt secondary with two secondary fuses Transformer secondary wired and protected for 240V phase to phase/120V phase to center tap neutral.								
5 (2.5)	30	15	—	2.5 (3)	2197-GK_A-___	2197-GK_A-___-16A	2197-GJ_A-___	(10)
7.5 (3.7)	40	20	20		2197-HK_A-___	2197-HK_A-___-16A	2197-HJ_A-___	
10 (5)	50	30	20		2197-JK_A-___	2197-JK_A-___-16A	2197-JJ_A-___	
15 (7.5)	70	40	30	3.0 (4)	2197-KK_A-___	2197-KK_A-___-16A	2197-KJ_A-___	
25 (12.5)	125	70	60		2197-MK_A-___	2197-MK_A-___-16A	2197-MJ_A-___	
37.5 (18.5)	200	100	70	3.0 20” D (4),(5)	2197-XK_A-___	2197-XK_A-___-16A	2197-XJ_A-___	
50 (25)	—	150	100		2197-YK_A-___	2197-YK_A-___-16A	2197-YJ_A-___	

Table is continued on the next page.

Table 86 -

Rating kVA [1]	Size of Primary Protection			Space Factor	Catalog Number [6] Wiring Type A Only—Class I			Delivery Program
	240 V	480 V	600 V		NEMA Type 1 and Type 1 w/ gasket [7]	NEMA Type 1 with filters and Type 1 w/ gasket and filters [8]	NEMA Type 12 [1]	
THREE PHASE—120/208 Volt secondary with three secondary fuses Transformer secondary wired and protected for 208V phase to phase/120V phase to WYE neutral.								
10 (5)	—	20	15	3.0 [4]	2197-PK_H-___	2197-PK_H-___-16A	2197-PJ_H-___	[10]
15 (7.5)	—	20	20		2197-QK_H-___	2197-QK_H-___-16A	2197-QJ_H-___	
25 (12.5)	—	40	30		2197-SK_H-___	2197-SK_H-___-16A	2197-SJ_H-___	
30 (15)	—	50	40		2197-TK_H-___	2197-TK_H-___-16A	2197-TJ_H-___	
37.5 (18.5)	—	60	50	3.0 20″ D [4]	2197-VK_H-___	2197-VK_H-___-16A	2197-VJ_H-___	
45 (22.5)	—	70	60		2197-WK_H-___	2197-WK_H-___-16A	2197-WJ_H-___	

(1) In NEMA Type 12 applications (non-ventilated 3 kVA and larger transformers), to maximize transformer life, we recommend that the transformer not be loaded to greater than 50% of its nameplate rating. Number in parentheses indicates approximate derated rating. However, in many applications, NEMA Type 1 with gasket design (vented and filtered door) is sufficient.

(2) Transformer secondary wired and protected for 240V phase to phase/120V phase to center tap neutral.

(3) Frame mounted unit. Must be located at bottom of section.

(4) Frame mounted unit, section does not have vertical wireway next to this unit. Must be located at bottom of section.

(5) For transformers with 240V primary, add 0.5 space factor.

(6) The catalog numbers listed are not complete:
- Select the primary voltage code from table on page 313 (for example, 2197-EK**B**D).
- Select the trip current from table on page 318 (for example, 2197-EKBD-**30**).
- Select the circuit breaker from table on page 321 (for example, 2197-EKBD-30**TGM**).

(7) For ratings 3 kVA and larger, vented door is provided.

(8) For ratings 3 kVA and larger, vented and filtered door is provided. 3 kVA and larger are available on NEMA Type 12 structures but unit is still NEMA Type 1/1G with gasket and filters. See page 157 for option -16A.

(9) 240V and 480V are SC in U.S. and Canada. 600V is PE in U.S. and SC in Canada.

(10) 240V and 480V are SC-II in U.S. and PE-II in Canada. 600V is PE-II in U.S. and SC-II in Canada.

Bulletin 2197Z Control and Lighting Transformer Unit with Circuit Breaker (XFMR)

TIP The (Z) denotes that the disconnect portion of the unit is 0.5 space factor.

See page 113 for product description.

TIP

- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- To address the heating effects from loads containing a high degree of harmonic content, it can be necessary to oversize the field conductors (especially neutrals), use k-factor lighting transformers, and oversize the lighting contactor units (increase by 50%). Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.
- Tap arrangement for 15…50 kVA single phase transformers is two 2-1/2% Taps FCAN, four 2-1/2% Taps FCBN.
  Tap arrangements for 10…45 kVA three phase transformers is two 2 1/ 2% Taps FCBN.
- Transformers with 7.5 kVA rating and larger have Class 180 °C, 80 °C rise.
- Units consists of a circuit breaker compartment and transformer compartment wired and interlocked together. This circuit breaker compartment has a horizontal operating handle.

For 71” high sections, see restrictions on page 32.

Table 87 -

Rating kVA (1)	Size of Primary Protection			Space Factor	Catalog Number (4) Wiring Type A Only—Class I			Delivery Program
	240 V	480 V	600 V		NEMA Type 1 and Type 1 w/ gasket (5)	NEMA Type 1 with filters and Type 1 w/ gasket and filters (6)	NEMA Type 12 (1)	
SINGLE PHASE—120 Volt secondary with one secondary fuse								
3 (1.5)	15	15	15	2.0 (2)	2197Z-FK_D-___	2197Z-FK_D-___-16A	2197Z-FJ_D-___	(7)
5 (2.5)	—	—	15	2.0 (2)	2197Z-GK_D-___	2197Z-GK-D___-16A	2197Z-GJ_D-___	
SINGLE PHASE—120/240 Volt secondary with two secondary fuses Transformer secondary wired and protected for 240V phase to phase/120V phase to center tap neutral.								
5 (2.5)	30	15	—	2.0 (2)	2197Z-GK_A-___	2197Z-GK_A-___-16A	2197Z-GJ_A-___	(7)
7.5 (3.7)	40	20	20		2197Z-HK_A-___	2197Z-HK_A-___-16A	2197Z-HJ_A-___	
10 (5)	50	30	20		2197Z-JK_A-___	2197Z-JK_A-___-16A	2197Z-JJ_A-___	
15 (7.5)	70	40	30	2.5 (3)	2197Z-KK_A-___	2197Z-KK_A-___-16A	2197Z-KJ_A-___	
25 (12.5)	125	70	60		2197Z-MK_A-___	2197Z-MK_A-___-16A	2197Z-MJ_A-___	
37.5 (18.5)	200	100	70	2.5 20” D (3)	2197Z-XK_A-___	2197Z-XK_A-___-16A	2197Z-XJ_A-___	
50 (25)	—	150	100		2197Z-YK_A-___	2197Z-YK_A-___-16A	2197Z-YJ_A-___	

Table is continued on the next page.

Table 87 -

Rating kVA [1]	Size of Primary Protection			Space Factor	Catalog Number [4] Wiring Type A Only—Class I			Delivery Program
	240 V	480 V	600 V		NEMA Type 1 and Type 1 w/ gasket [5]	NEMA Type 1 with filters and Type 1 w/ gasket and filters [6]	NEMA Type 12 [1]	
THREE PHASE—120/208 Volt secondary with three secondary fuses Transformer secondary wired and protected for 208V phase to phase/120V phase to WYE neutral.								
10 (5)	—	20	15	2.5 [3]	2197Z-PK_H-___	2197Z-PK_H-___-16A	2197Z-PJ_H-___	[7]
15 (7.5)	—	20	20		2197Z-QK_H-___	2197Z-QK_H-___-16A	2197Z-QJ_H-___	
25 (12.5)	—	40	30		2197Z-SK_H-___	2197Z-SK_H-___-16A	2197Z-SJ_H-___	
30 (15)	—	50	40		2197Z-TK_H-___	2197Z-TK_H-___-16A	2197Z-TJ_H-___	
37.5 (18.5)	—	60	50	2.5 20″ D [3]	2197Z-VK_H-___	2197Z-VK_H-___-16A	2197Z-VJ_H-___	
45 (22.5)	—	70	60		2197Z-WK_H-___	2197Z-WK_H-___-16A	2197Z-WJ_H-___	

(1) In NEMA Type 12 applications (non-ventilated 3 kVA and larger transformers), to maximize transformer life, we recommend that the transformer not be loaded to greater than 50% of its nameplate rating. Number in parentheses indicates approximate derated rating. However, in many applications, NEMA Type 1 with gasket design (vented and filtered door) is sufficient.

(2) Frame mounted unit. Must be located at bottom of section.

(3) Frame mounted unit, section does not have vertical wireway next to this unit. Must be located at bottom of section.

(4) The catalog numbers listed are not complete:
- Select the primary voltage code from table on page 313 (for example, 2197Z-FK**B**D).
- Select the trip current from table on page 318 (for example, 2197Z-FKBD-**30**).
- Select the circuit breaker from table on page 321 (for example, 2197Z-FKBD-30**TGM**).

(5) For ratings 3 kVA and larger, vented door is provided.

(6) For ratings 3 kVA and larger, vented and filtered door is provided. 3kVA and larger are available on NEMA Type 12 structures but unit is still NEMA Type 1/1G with gasket and filters. See page 157 for option -16A.

(7) 240V and 480V are SC-II in U.S. and PE-II in Canada. 600V is PE-II in U.S. and SC-II in Canada.

Bulletin 2197 Control and Lighting Transformer Unit with Circuit Breaker (XFMR), continued

See page 113 for product description.

TIP

- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- To address the heating effects from loads containing a high degree of harmonic content, it can be necessary to oversize the field conductors (especially neutrals), use k-factor lighting transformers, and oversize the lighting contactor units (increase by 50%). Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.
- Transformers with 7.5 kVA rating and larger have Class 180 °C, 80 °C rise.
- 3…50 kVA consists of a circuit breaker compartment and transformer compartment wired and interlocked together.

For 71" high sections, see restrictions on page 32.

Table 88 -

Rating kVA (1)	Size of Primary Protection			Space Factor	Catalog Number (7) Wiring Type A—Class I			Delivery Program
	380 V	400 V	415 V		NEMA Type 1 and Type 1 w/ gasket (8)	NEMA Type 1 with filters and Type 1 w/ gasket and filters (9)	NEMA Type 12 (1)	
SINGLE PHASE—110/115 secondary with one 1-pole circuit breaker (2)								
0.5 (2)	15	15	15	1.0	2197-AK_S-___	—	2197-AJ_S-___	PE
0.75 (2)					2197-BK_S-___	—	2197-BJ_S-___	
1 (2)				1.5	2197-CK_S-___	—	2197-CJ_S-___	
1.6 (2)				2.0	2197-ZK_S-___	—	2197-ZJ_S-___	
2 (2)					2197-EK_S-___	—	2197-EJ_S-___	
3 (1.5) (2)				2.5 (5)	2197-FK_S-___	2197-FK_S-___-16A	2197-FJ_S-___	PE-II
SINGLE PHASE—110/220 Volt secondary with two 1-pole circuit breakers Transformer secondary wired and protected for 220V phase-to-phase, 110V phase-to-center tap neutral.								
5 (2) (2.5)	20	—	—	2.5 (5)	2197-GKNP-___	2197-GKNP-___-16A	2197-GJNP-___	PE-II
7.5 (2) (3.7)	20	—	—		2197-HKNP-___	2197-HKNP-___-16A	2197-HJNP-___	
10 (2) (5)	30	—	—		2197-JKNP-___	2197-JKNP-___-16A	2197-JJNP-___	
15 (7.5) (3)	50	—	—	3.0 (6)	2197-KKNP-___	2197-KKNP-___-16A	2197-KJNP-___	
SINGLE PHASE—115/230 Volt secondary with two 1-pole circuit breakers Transformer secondary wired and protected for 230V phase-to-phase, 115V phase-to-center tap neutral.								
5 (2.5)	—	20	—	2.5 (5)	2197-GKKNP-___	2197-GKKNP-___-16A	2197-GJKNP-___	PE-II
7.5 (3.7)	—	20	—		2197-HKKNP-___	2197-HKKNP-___-16A	2197-HJKNP-___	
10 (5)	—	30	—		2197-JKKNP-___	2197-JKKNP-___-16A	2197-JJKNP-___	

Table is continued on the next page.

Table 88 -

Rating kVA [1]	Size of Primary Protection			Space Factor	Catalog Number [7] Wiring Type A—Class I			Delivery Program
	380 V	400 V	415 V		NEMA Type 1 and Type 1 w/ gasket [8]	NEMA Type 1 with filters and Type 1 w/ gasket and filters [9]	NEMA Type 12 [1]	
SINGLE PHASE—120/240 Volt secondary with two 1-pole circuit breakers [4] Transformer secondary wired and protected for 240V phase-to-phase, 120V phase-to-center tap neutral.								
5 (2.5) [2]	—	—	20	2.5 [5]	2197-GKIT-___	2197-GKIT-___-16A	2197-GJIT-___	PE-II
7.5 (3.7) [2]	—	—	20		2197-HKIT-___	2197-HKIT-___-16A	2197-HJIT-___	
10 (5) [2]	—	—	30		2197-JKIT-___	2197-JKIT-___-16A	2197-JJIT-___	
15 (7.5) [3]	—	—	50	3.0 [6]	2197-KKIP-___	2197-KKIP-___-16A	2197-KJIP___	

(1) In NEMA Type 12 applications (non-ventilated 3 kVA and larger transformers), to maximize the transformer's life, we recommend that the transformer not be loaded to greater than 50% of its nameplate rating. Number in parentheses indicates approximate derated rating. However, in many applications, NEMA Type 1 with gasket design (vented and filtered doors) is sufficient.

(2) Incorporates primary taps for future conversion to new global IEC voltage standards (for example, 400 V/115 V/230 V). Allows conversion without the need to replace transformers.

(3) Tap arrangement is two 2-1/2% Taps FCAN, four 2-1/2% Taps FCBN.

(4) The 15 kVA transformer has 110/220V secondary with two 1-pole circuit breakers.

(5) Frame mounted unit. Must be located at bottom of section.

(6) Frame mounted unit, section does not have vertical wireway next to this unit. Must be located at bottom of section.

(7) The catalog numbers listed are not complete.
- Select the primary voltage code from table on page 313 (for example, 2197-EK**NS**).
- Select the trip current from table on page 319 (for example, 2197-EKNS-**30**).
- Select the circuit breaker from table on page 321 (for example, 2197-EKNS-30**TGM**).

(8) For ratings 3 kVA and larger, vented door is provided.

(9) For ratings 3 kVA and larger, vented and filtered door is provided. 3 kVA and larger are available on NEMA Type 12 structures but unit is still NEMA Type 1/1G with gasket and filters. See page 157 for option -16A.

Bulletin 2197Z Control and Lighting Transformer Unit with Circuit Breaker (XFMR), continued

TIP The (Z) denotes that the disconnect portion of the unit is 0.5 space factor.

See page 113 for product description.

TIP
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- To address the heating effects from loads containing a high degree of harmonic content, it can be necessary to oversize the field conductors (especially neutrals), use k-factor lighting transformers, and oversize the lighting contactor units (increase by 50%). Contact your local Allen-Bradley distributor or Rockwell Automation sales representative.
- Transformers with 7.5 kVA rating and larger have Class 180 °C, 80 °C rise.
- Units consists of a circuit breaker compartment and transformer compartment wired and interlocked together. The circuit breaker compartment has a horizontal operation handle.

For 71" high sections, see restrictions on page 32.

Table 89 -

Rating kVA (1)	Size of Primary Protection			Space Factor	Catalog Number (7) Wiring Type A—Class I			Delivery Program
	380 V	400 V	415 V		NEMA Type 1 and Type 1 w/ gasket (8)	NEMA Type 1 with filters and Type 1 w/ gasket and filters (9)	NEMA Type 12 (1)	
SINGLE PHASE—110/115 secondary with one 1-pole circuit breaker (2)								
3 (1.5) (2)	15	15	15	2.0 (5)	2197Z-FK_S-___	2197Z-FK_S-___-16A	2197Z-FJ_S-___	PE-II
SINGLE PHASE—110/220V secondary with two 1-pole circuit breakers Transformer secondary wired and protected for 220V phase-to-phase, 110V phase-to-enter tap neutral.								
5 (2) (2.5)	20	—	—	2.0 (5)	2197Z-GKNP-___	2197Z-GKNP-___-16A	2197Z-GJNP-___	PE-II
7.5 (2) (3.7)	20	—	—		2197Z-HKNP-___	2197Z-HKNP-___-16A	2197Z-HJNP-___	
10 (2) (5)	30	—	—		2197Z-JKNP-___	2197Z-JKNP-___-16A	2197Z-JJNP-___	
15 (7.5) (3)	50	—	—	2.5 (6)	2197Z-KKNP-___	2197Z-KKNP-___-16A	2197Z-KJNP-___	
SINGLE PHASE—115/230V secondary with two 1-pole circuit breakers Transformer secondary wired and protected for 230V phase-to-phase, 115V phase-to-center tap neutral.								
5 (2.5)	—	20	—	2.0 (5)	2197Z-GKKNP-___	2197Z-GKKNP-___-16A	2197Z-GJKNP-___	PE-II
7.5 (3.7)	—	20	—		2197Z-HKKNP-___	2197Z-HKKNP-___-16A	2197Z-HJKNP-___	
10 (5)	—	30	—		2197Z-JAKNP-___	2197Z-JAKNP-___-16A	2197Z-JJKNP-___	

Table is continued on the next page.

Table 89 -

Rating kVA [1]	Size of Primary Protection			Space Factor	Catalog Number [7] Wiring Type A—Class I			Delivery Program
	380 V	400 V	415 V		NEMA Type 1 and Type 1 w/ gasket [8]	NEMA Type 1 with filters and Type 1 w/ gasket and filters [9]	NEMA Type 12 [1]	
SINGLE PHASE—120/240V secondary with two 1-pole circuit breakers [4] Transformer secondary wired and protected for 240V phase-to-phase, 120V phase-to-center tap neutral. 0								
5 (2.5) [2]	—	—	20	2.0 [5]	2197Z-GKIT-___	2197Z-GKIT-___-16A	2197Z-GJIT-___	PE-II
7.5 (3.7) [2]	—	—	20		2197Z-HKIT-___	2197Z-HKIT-___-16A	2197Z-HJIT-___	
10 (5) [2]	—	—	30		2197Z-JKIT-___	2197Z-JKIT-___-16A	2197Z-JJIT-___	
15 (7.5) [3]	—	—	50	2.5 [6]	2197Z-KKIP-___	2197Z-KKIP-___-16A	2197Z-KJIP___	

(1) In NEMA Type 12 applications (non-ventilated 3 kVA and larger transformers), to maximize the transformer's life, we recommend that the transformer not be loaded to greater than 50% of its nameplate rating. Number in parentheses indicates approximate derated rating. However, in many applications, NEMA Type 1 with gasket design (vented and filtered doors) is sufficient.

(2) Incorporates primary taps for future conversion to new global IEC voltage standards (for example, 400V/115V/230V). Allows conversion without the need to replace transformers.

(3) Tap arrangement is two 2-1/2% Taps FCAN, four 2-1/2% Taps FCBN.

(4) The 15 kVA transformer has 110/220V secondary with two 1-pole circuit breakers.

(5) Frame mounted unit. Must be located at bottom of section.

(6) Frame mounted unit, section does not have vertical wireway next to this unit. Must be located at bottom of section.

(7) The catalog numbers listed are not complete.
- Select the primary voltage code from table on page 313 (for example, 2197Z-EK**NS**).
- Select the trip current from table on page 319 (for example, 2197Z-EKNS-**30**).
- Select the circuit breaker from table on page 321 (for example, 2197Z-EKNS-30**TGM**).

(8) For ratings 3 kVA and larger, vented door is provided.

(9) For ratings 3 kVA and larger, vented and filtered door is provided. 3 kVA and larger are available on NEMA Type 12 structures but unit is still NEMA Type 1/1G with gasket and filters. See page 157 for option -16A.

Notes:

Chapter 10

Miscellaneous Units

Catalog Number Explanation - Full Section Mounting Plates

Table 90 -

Full Section Blank Mounting Plate with No Disconnecting Means, with or without Horizontal Power Bus

2100	-	E	K	C	1	X	1	B	-		-	120	-	**

Full Section Blank Mounting Plate with Fusible Disconnect Switch, with or without Horizontal Power Bus

2100	-	F	K	C	1	X	1	B	-	24J	-	120	-	**

Full Section Blank Mounting Plate with Circuit Breaker, with or without Horizontal Power Bus

2100	-	G	K	C	1	X	1	B	-	32TGM	-	120	-	**
Bulletin Number		Disconnecting Means	NEMA Type	Voltage	Unit Depth	Placeholder	Unit Width	Mounting Plate Depth		Fuse Clip or Circuit Breaker		Horizontal Power Bus		Options

Code	Type
2100	

Code	Disconnecting Means
E	No disconnecting means
F	With fusible disconnect
G	With circuit breaker

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Voltage
A	Up to 250V
C	Up to 600V

Code	Unit Depth
1	15″ Deep
2	20″ Deep

Code	Placeholder
X is a placeholder	

Code	Unit Width
1	20″ wide
2	25″ wide
3	30″ wide
4	35″ wide
5	40″ wide

Code	Mounting Plate Depth
B	14″ Deep
C	19″ Deep
D	8.5″ Deep

Code	Fuse Clip or Circuit Breaker
2100-F and 2100-G *only*	See page 135 for fuse clip rating or circuit breaker

Code	Horizontal Power Bus
Blank	Provided with horizontal power bus
120	No horizontal power bus is provided

Code	Option
See available Options	

Full Section Blank Mounting Plates

- Line side of disconnect or circuit breaker is connected to horizontal bus for sections with horizontal bus.
- Customer cables connect to the line side of the disconnect or circuit breaker for sections without horizontal bus.

Table 91 -

Description				Space Factor	Catalog Number (3)		Delivery Program
					NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
Full section Blank Mounting Plates (1) (2)	Full width door, no vertical wireway or vertical bus, with or without horizontal power bus. Frame Mounted.	With no disconnect means	With horizontal bus	6.0	2100-EKC_ X _ _	2100-EJC_ X _ _	SC-II
			Without horizontal bus		2100-EKC_ X _ _-120	2100-EJC_ X _ _-120	
		With fusible disconnect switch	With horizontal bus		2100-FK_ _ X _ _-_	2100-FJ_ _ X _ _-_	
			Without horizontal bus		2100-FK_ _ X _ _-_-120	2100-FJ_ _ X _ _-_-120	
		With circuit breaker	With horizontal bus		2100-GKC_ X _ _ -_	2100-GJC_ X _ _ -_	
			Without horizontal bus		2100-GKC_ X _ _-_-120	2100-GJC_ X _ _-_-120	

(1) 20″ wide sections can be grouped up to three sections in a shipping split. 25″ and wider sections are in separate shipping splits. Sections without horizontal bus must be located on the end of the MCC lineup, in a separate shipping split.

(2) Industrial EtherNet switches are not mounted in Full Section Blank Mounting Plates.

(3) The catalog numbers listed are not complete:

For 2100-E catalog numbers

- Select unit depth from table below (for example, 2100-EKC**1**).
- Select unit width from table below (for example, 2100-EKC1X**1**).
- Select mounting plate depth from table below (for example, 2100-EKC1X1**D**).

For 2100-F catalog numbers

- Select fuse clip voltage from table below (for example, 2100-FK**C**).
- Select unit depth from table below (for example, 2100-FKC**1**).
- Select unit width from table below (for example, 2100-FKC1X**1**).
- Select mounting plate depth from table below (for example, 2100-FXC1X1**D**).
- Select disconnect rating and fuse clip from table on page 135 (for example, 2100-FKC1X1D-**24J**).

For 2100-G catalog numbers

- Select unit depth from table below (for example, 2100-GKC**1**).
- Select unit width from table below (for example, 2100-GKC1X**1**).
- Select mounting plate depth from table below (for example, 2100-GKC1X1**D**).
- Select trip current and circuit breaker option from tables on page 135 (for example, 2100-GKC1X1D-**32TGM**).

Table 92 - Voltage Code

Fuse Clip Voltage	Code
250	A
600	C

Table 93 - Unit Depth

Unit Depth (In.)	Code
15	1
20	2

Table 94 - Unit Width

Width (Inches)	Code	Depth
20	1	15
25	2	
30	3	
35	4	
40 (1)	5	
20	1	20
25	2	
30	3	
35	4	
40 (1)	5	

(1) Only available with 2100-E. 40″ wide section is a two-door section with a 3-point latch. 40″ wide cannot have horizontal power bus.

Table 95 - Mounting Plate Depth

Mounting Plate Depth (Inches)	Code
14	B (1),(2)
19	C (3)
8.5	D (4)

(1) Horizontal bus is 5″ deeper than standard.
(2) For 15″ deep sections without horizontal bus or 20″ deep sections with or without horizontal bus.
(3) Only available with 20″ deep section without horizontal bus.
(4) Not available with 40″ wide mounting plate.

Table 96 - Disconnect Rating and Fuse Clip

Disconnect Rating and Fuse Clip Size	Fuse Clip Class	Short Circuit withstand Rating through 600V	Fuse Clip Designator
30	J	100 kA	24J
	R	100 kA	24R
	H	10 kA	24
60	J	100 kA	25J
	R	100 kA	25R
	H	10 kA	25
100	J	100 kA	26J
	R	100 kA	26R
	H	10 kA	26
200	J	100 kA	27J
	R	100 kA	27R
	H	10 kA	27
400	J	100 kA	28J
	R	100 kA	28R
	H	10 kA	28

Table 97 - Trip Current

Trip Current (Amperes)	Number	Trip Current (Amperes)	Number	Trip Current (Amperes)	Number
15	30	80	38	200	44
20	31	90	39	225	45
30	32	100	40	250	46
40	34	125	41	300	48
50	35	150	42	350	49
60	36	175	43	400	50
70	37	—	—	—	—

Table 98 - Circuit Breaker Option(1)

Rating (Amperes)	High Interrupting Capacity (typical rating) 100 kA at 240V 65 kA at 480V		Extra High Interrupting Capacity 100 kA at 480V 35 kA at 600V		Ultra High Interrupting Capacity 100 kA at 600V	
	Suffix	Frame	Suffix	Frame	Suffix	Frame
15…70	TGM	G6C3	THX	H0C3	TJU	J15C3
80…125	TGM	G6C3	THX	H0F3	TJU	J15F3
150	TJM	J6F3	TJX	J0F3	TJU	J15F3
175…250	TJM	J6F3	TJX	J0F3	—	—
300…400	TKM	K6H3	TKX	K0H3	TKU	K15H3

(1) Refer to page 353 for circuit breaker interrupting capacity ratings.

Table 99 - Blank Unit Doors

Description		Space Factor	Catalog Number Wiring Type A Only—Class I		Delivery Program
			NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
Blank Unit Door	Covers the unused unit space (includes unit support pan)	0.5	2100-BK05	2100-BJ05	SC
		1.0	2100-BK10	2100-BJ10	
		1.5	2100-BK15	2100-BJ15	
		2.0	2100-BK20	2100-BJ20	
		2.5	2100-BK25	2100-BJ25	
		3.0	2100-BK30	2100-BJ30	
		3.5	2100-BK35	2100-BJ35	
		4.0	2100-BK40	2100-BJ40	

Table 100 - Field-mounted Equipment Units

Description		Space Factor	Catalog Number Wiring Type A Only—Class I		Delivery Program
			NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
Empty Unit Insert (1)	For field installed equipment and 8.625" working depth. No plug-in stabs. Inserts come with unit support pan and door. Inserts are NOT UL listed and are NOT CSA certified.	0.5 (8)	2100-NK05	2100-NJ05	SC
		1.0	2100-NK10	2100-NJ10	
		1.5	2100-NK15	2100-NJ15	
		2.0	2100-NK20	2100-NJ20	
		2.5	2100-NK25	2100-NJ25	
		3.0	2100-NK30	2100-NJ30	
		3.5	2100-NK35	2100-NJ35	
		4.0	2100-NK40	2100-NJ40	
Empty Unit Insert with Disconnecting Means (1),(2),(3)	For field installed equipment, 8.625" working depth. Includes fusible disconnect and plug-in stabs.(6) Inserts come with unit support pan and door. *Adding equipment to this unit insert may require field evaluation by UL/CSA to retain listing/certification.*	1.5	2100D-CK_-___	2100D-CJ_-___	
		2.0	2100D-DK_-___	2100D-DJ_-___	
		2.5	2100D-EK_-___	2100D-EJ_-___	
		3.0	2100D-FK_-___	2100D-FJ_-___	
		3.5	2100D-GK_-___	2100D-GJ_-___	
		4.0	2100D-HK_-___	2100D-HJ_-___	
Empty Unit Insert with Disconnecting Means (1),(4),(5)	For field installed equipment, 8.625" working depth. Includes inverse time (thermal magnetic) circuit breaker and plug-in stabs.(7) Inserts come with unit support pan and door. *Adding equipment to this unit insert may require field evaluation by UL/CSA to retain listing/certification.*	1.5	2100M-CKC-___	2100M-CJC-___	SC
		2.0	2100M-DKC-___	2100M-DJC-___	
		2.5	2100M-EKC-___	2100M-EJC-___	
		3.0	2100M-FKC-___	2100M-FJC-___	
		3.5	2100M-GKC-___	2100M-GJC-___	
		4.0	2100M-HKC-___	2100M-HJC-___	

(1) See Options, Modifications, and Accessories, pages 169, for terminal block options.
(2) These units do not meet service entrance requirements. Not intended to be used as feeder circuits.
(3) See Appendix for interrupting capacity ratings.
(4) These units do not meet service entrance requirements. Not intended to be used as feeder circuits.
(5) See Appendix for interrupting capacity ratings.
(6) The catalog numbers listed are not complete:
- Select the voltage code from table on page 138 (for example, 2100D-CK**C**).
- Select the fuse clip designator from table on page 138 (for example, 2100D-CKC-**24J**).
- If power fuse is selected, select from page 317 (for example, 2100D-CKC-24J-**604G**).

(7) The catalog numbers listed are not complete:
- Select the trip current from table on page 138 (for example, 2100M-CKC-**30**).
- Select the circuit breaker from table on page 139 (for example, 2100M-CKC-**30TGM**).

(8) Terminal block options (-800, -801, -802, -803, -804) are not available on 2100-NK05 or 2100-NJ05.

Tables for Configuring Bulletin 2100D and 2100M Unit Catalog Numbers

Table 101 - Voltage Code

Fuse Clip Voltage	Voltage Code
250	A
600	C

Table 102 - Fuse Clip Designator (1)

Fuse Clip Rating (Amperes)	Fuse Clip Class	Short Circuit withstand Rating through 600V	Fuse Clip Designator
30	J	100 kA	24J
	R	100 kA	24R
	H	10 kA	24
	CC	100 kA	24C
60	J	100 kA	25J
	R	100 kA	25R
	H	10 kA	25
100	J	100 kA	26J
	R	100 kA	26R
	H	10 kA	26
200 (2)	J	100 kA	27J
	R	100 kA	27R
	H	10 kA	27

(1) Refer to the CENTERLINE Motor Control Centers Power Fuses Product Data, publication 2100-TD003.
(2) Not available in 1.5 space factors.

Table 103 - Trip Current

Trip Current (Amperes)	Number	Trip Current (Amperes)	Number
15	30	90	39
20	31	100	40
30	32	125	41
40	34	150	42
50	35	175	43
60	36	200	44
70	37	225	45
80	38	—	—

Table 104 - Inverse Time (Thermal Magnetic) Circuit Breaker Option [1],[2]

Rating (Amperes)	High Interrupting Capacity (typical rating) 100 kA at 240V 65 kA at 480V		Extra High Interrupting Capacity 100 kA at 480V 35 kA at 600V		Ultra High Interrupting Capacity 100 kA at 600V	
	Suffix	Frame	Suffix	Frame	Suffix	Frame
15…70	TGM	G6C3	THX	H0C3	TJU	J15C3
80…125	TGM	G6C3	THX	H0F3	TJU	J15F3
150	TJM	J6F3	TJX	J0F3	TJU	J15F3
175…250	TJM	J6F3	TJX	J0F3	—	—

(1) Refer to page 353 for circuit breaker interrupting capacity ratings.

(2) Refer to the CENTERLINE MCCs Thermal Magnetic Circuit Breakers, publication 2100-TD032.

Table 105 - Miscellaneous DeviceNet Units and EtherNet/IP Units

Description		Space Factor	Catalog Number[13] Wiring Type A Only—Class I		Delivery Program
			NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
DeviceNet Power Supply Unit (110…120V AC input and 8.0 A 24V DC output) [1] This power supply is to be used with 8.0 A Class I Cable only. Refer to the DeviceNet Media Design and Installation Manual, publication DNET-UM072. [2], [3]	Without disconnection means, plug-in stabs or control circuit transformer. Requires separate 110…120V AC source.	0.5	2100-DPS8KXWD	2100-DPS8JXWD	SC
	Includes disconnect, fuses and 350VA control circuit transformer to provide power to power supply	1.0	2100-DPS8K_[10]	2100-DPS8J_[10]	
	Includes circuit breaker, fuses and 350VA control circuit transformer to provide power to power supply	1.5	2100-DPS8K_-30_[11]	2100-DPS8J_-30_[11]	
	Includes circuit breaker, fuses and 350VA control circuit transformer to provide power to power supply. (Unit disconnecting means has a horizontal handle.)	1.0	2100-DPS8K_H-30_[11]	2100-DPS8J_H-30_[11]	
Redundant DeviceNet Power Supply Unit (110…120V AC input and 8.0 A, 24V DC output). Two power supplies providing back-up for DeviceNet system.[1], [3], [4]	Without disconnection means, plug-in stabs or control circuit transformer. Requires separate 110…120V AC source.	1.0	2100-DPS8KXWD-767C	2100-DPS8JXWD-767C	
	Includes disconnect, fuses and 750VA control circuit transformer to provide power to power supply	1.5	2100-DPS8K_-767C[10]	2100-DPS8J_-767C[10]	
	Includes circuit breaker, fuses and 750VA control circuit transformer to provide power to power supply	1.5	2100-DPS8K_-30_-767C[11]	2100-DPS8J_-30_-767C[11]	
Ethernet Power Supply Unit (110…120V AC input and 8.0 A 24V DC output).[1] This power supply is to be used with two 4.0 A outputs for Class II Wiring.[5], [6]	Without disconnection means, plug-in stabs, or control circuit transformer. Requires separate 110…120V AC source.	0.5	2100-EPS8KXWD	2100-EPS8JXWD	
	Includes disconnect, fuses, and control circuit transformer to provide power to power supply.	1.0	2100-EPS8K_[12]	2100-EPS8J_[12]	
	Includes circuit breaker, fuses, and control circuit transformer to provide power to power supply.	1.5	2100-EPS8K_-30_[13]	2100-EPS8J_-30_[13]	
	Includes circuit breaker, fuses, and control circuit transformer to provide power to power supply. (Unit disconnecting means has a horizontal handle.)	1.0	2100-EPS8K_H-30_[13]	2100-EPS8J_H-30_[13]	
Redundant Ethernet Power Supply Unit (110…120V AC input and 8.0 A, 24V DC output). Two power supplies providing back-up for Ethernet system.[1], [6]	Without disconnection means, plug-in stabs, or control circuit transformer. Requires separate 110…120V AC source.	1.0	2100-EPS8KXWD-786C	2100-EPS8JXWD-768C	
	Includes disconnect, fuses, and control circuit transformer to provide power to power supply.	1.5	2100-EPS8K_-768C[12]	2100-EPS8J_-768C[12]	
	Includes circuit breaker, fuses, and control circuit transformer to provide power to power supply.	1.5	2100-EPS8K_-30_-768C[13]	2100-EPS8J_-30_-768C[13]	

Table is continued on the next page.

Table 105 - Miscellaneous DeviceNet Units and EtherNet/IP Units

Description		Space Factor	Catalog Number(13) Wiring Type A Only—Class I		Delivery Program
			NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
Bulletin 1788 ControlNet to DeviceNet linking device used to interface a DeviceNet network to a ControlNet network without the need for a PLC chassis (7),(8), (3)	Without disconnecting means, plug-in stabs, or control circuit transformer. Requires separate 110…120V AC source. Viewing window in door to provide visual verification of status indicators.	0.5	2100-C2DKXWD	2100-C2DJXWD	SC
	With disconnect, fuses, and 80VA control circuit transformer. Viewing window in door to provide visual verification of status indicators.	1.0	2100-C2DK_ (10)	2100-C2DJ_ (10)	
	With circuit breaker, fuses, and 80VA control circuit transformer. Viewing window in door to provide visual verification of status indicators.	1.0	2100-C2DK_-30_ (11)	2100-C2DJ_-30_ (11)	
Bulletin 1788 Ethernet to DeviceNet linking device. Used to connect an Ethernet network to a DeviceNet network without the need for a PLC chassis.(7),(9), (3)	Without disconnecting means, plug-in stabs or control transformer. Requires separate 110…120V AC source. Viewing window in door to provide visual verification of status indicators.	0.5	2100-E2DKXWD	2100-E2DJXWD	
	With fusible disconnect and 80VA control transformer. Viewing window in door to provide visual verification of status indicators.	1.0	2100-E2DK_ (10)	2100-E2DJ_ (10)	
	With circuit breaker and 80VA control transformer. Viewing window in door to provide visual verification of status indicators.	1.0	2100-E2DK_-30_ (11)	2100-E2DJ_-30_ (11)	
External DeviceNet Connector Unit with remotely powered 120V AC receptacle (3)	Door mounted external DeviceNet connection and 120V AC receptacle for connection of computer to DeviceNet without having to open doors.	0.5	2100-DCK05XWD	2100-DCJ05XWD	

(1) Includes buffer module which provides for minimum 500 ms ride-through at full-load. Power supply must be located within one section of center for MCCs with eight or more sections.

(2) See page 169 for optional external DeviceNet connector with 120V AC receptacle (option 767A).
DeviceNet power supply requires a 95…132V AC 50/60 Hz power source that provides sinusoidal waveform. Use of non-sinusoidal power sources, including some UPSs, could damage the DeviceNet power supply.

(3) Not available for IntelliCENTER MCC with EtherNet/IP network orders.

(4) Optional DeviceNet Starter Auxiliary (Option -11DSA3) is available. Select from page 156.

(5) See page 169 for optional external Ethernet Connector with 120V AC receptacle (option -768A).
Ethernet power supply requires a 95…132V AC 50/60 Hz power source that provides sinusoidal waveform. Use of non-sinusoidal power sources, including some UPSs, could damage the Ethernet power supply.

(6) Not available for DeviceNet IntelliCENTER Orders.

(7) ControlNet to DeviceNet linking device units are supplied with a 1794 Flex I/O power supply to provide the 24V DC source for the unit so the linking device unit does not burden the DeviceNet power supply with its 1.0 A load.

(8) Refer to the ControlNet Coax Media Planning and Installation Guide, publication CNET-IN002, and the Industrial Automation Wiring and Grounding Guidelines, publication 1770-IN041, for information on installing and routing ControlNet Cable.

(9) Refer to the Ethernet Design Considerations Reference Manual, publication ENET-RM002, and the Industrial Automation Wiring and Grounding Guidelines, 1770-IN041, for information on installing and routing ethernet cable.

(10) The catalog numbers listed are not complete. Short circuit withstand rating is 100 kA. Select the voltage code from the Voltage Code Table below (for example, 2100-DPS8K**B**).

(11) The catalog numbers listed are not complete:
Select the voltage code from the Voltage Code Table below (for example, 2100-DPS8K**B**).
Select the circuit breaker from the Inverse Time (Thermal Magnetic) Circuit Breaker Option Table below (for example, 2100-DPS8KB-30**TGM**).

(12) The catalog numbers listed are not complete. Short circuit withstand rating is 100 kA. Select the voltage code from the Voltage Code Table below (for example, 2100-EPS8K**B**).

(13) The catalog numbers listed are not complete:
- Select the voltage code from the Voltage Code Table below (for example, 2100-EPS8K**B**).
- Select the circuit breaker from the Inverse Time (Thermal Magnetic) Circuit Breaker Option Table below (for example, 2100-EPS8KB-30**TGM**).

Table 106 - Voltage Code

Fuse Clip Voltage	Voltage Code
220…230	P
240	A
380	N
400	KN
415	I
480	B
600	C

Table 107 - Inverse Time (Thermal Magnetic) Circuit Breaker Option(1)

Suffix	Frame Type	Circuit Breaker Description
TGM	G6C3	High Interrupting Capacity 100 kA at 240V 65 kA at 480V
THX	H0F3	Extra High Interrupting Capacity 100 kA at 480V 35 kA at 600V
TJU	J15F3	Ultra High Interrupting Capacity 100 kA at 600V

(1) Refer to Appendix for circuit breaker interrupting capacity ratings.

Table 108 - Catalog Explanation for Stratix Switch Unit

2100	-	ESW	10	K	-	T	10	L	A	P
Bulletin Number		Ethernet Switch Unit	Switch Size (Port Count)	Enclosure Code		Mounting Location	Space Factor	Switch Software Type	Switch Features	Wireway Adapter Connection Type
			Table 109	Table 110		Table 111	Table 112	Table 113	Table 114	Table 115

Table 109 - Switch Size (Port Count)

Code	Switch Size (Port Count)	Delivery Program
06	6-port Stratix 5700 (4 usable ports)	PE
10	10-port Stratix 5700 (8 usable ports)	PE
20(1)	20-port Stratix 5700 (16 usable ports)	PE
30(1)	10 and 20-port Stratix 5700 (24 usable ports)	PE
M10(2)	Two10-port Stratix 5700 (16 usable ports)	PE

(1) Only available with unit design (Space Factor Option 10).
(2) Only available in a wireway unit (Space Factor option HW). Option goes away in CR2.

Table 110 - Enclosure Code

Code	Enclosure Code(1)	Delivery Program
K	NEMA 1/1G Enclosure	PE
J	NEMA 12 Enclosure	PE

(1) Must match the system enclosure code.

Table 111 - Mounting Location

Code	Mounting Location[1]	Delivery Program
T	Top Mounted	PE
B	Bottom Mounted	PE

(1) Defaulted to match the System Selection. If changed to the other location in the unit, then Delivery Program is changed to ENG.

Table 112 - Space Factor

Code	Space Factor	Delivery Program
HW[1]	Horizontal Wireway	PE
05	0.5 SF Design	PE
10	1.0 SF Design	PE

(1) Only available with 6 or 10-port switch options (06, 10, or M10)

Table 113 - Switch Software Type

Code	Switch Software Type	Delivery Program
F	Full Stratix 5700 Firmware	PE
L	Lite Stratix 5700 Firmware (default)	PE

Table 114 - Switch Features

Code	Switch Features	Delivery Program
A	No Additional Options (default)	PE
B[1],[2]	Gigabit	ENG
C[1],[3],[4]	CIP Sync (Includes Gigabit Ports)	ENG
D[1],[3],[4]	NAT (Includes CIP Sync and Gigabit Ports)	ENG

(1) For 6-port switch, gigabit ports are RJ-45 ports 5 and 6.
For 10-port switch, gigabit ports are combo ports 9 and 10.
For 20-port switch, gigabit ports are combo ports 19 and 20.
(2) Not available on 20-port and 30-port with full firmware (firmware option F).
(3) Only available with full firmware (firmware option F).
(4) Only available on 10-port or 20-port switches in 0.5 or 1.0 SF designs; not available in horizontal wireway. Not available with 06 or 30 port options.

Table 115 - Wireway Adapter Connection Type

Code	Wireway Adapter Connection Type	Delivery Program
P[1]	Power Adapters Only	PE
A[2]	Both Ethernet and Power Adapters	PE

(1) Available with wireway mounted switch in CR2.
(2) Available with unit mounted switch in CR2.

Table 116 - Other Miscellaneous Units

Description				Space Factor	Catalog Number Wiring Type A Only—Class I		Delivery Program
					NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
NEMA Type 'C' Terminal Board Unit (supplied unwired)	Includes Bulletin 1492-CA1 terminal blocks	Top- mounted	44 TB	1.0	2100-CK10T-0044CA	2100-CJ10T-0044CA	SC
			66 TB		2100-CK10T-0066CA	2100-CJ10T-0066CA	
			88 TB		2100-CK10T-0088CA	2100-CJ10T-0088CA	
			110 TB		2100-CK10T-0110CA	2100-CJ10T-0110CA	
		Bottom- mounted	44 TB		2100-CK10B-0044CA	2100-CJ10B-0044CA	
			66 TB		2100-CK10B-0066CA	2100-CJ10B-0066CA	
			88 TB		2100-CK10B-0088CA	2100-CJ10B-0088CA	
			110 TB		2100-CK10B-0110CA	2100-CJ10B-0110CA	
		Top- mounted	76 TB	1.5	2100-CK15T-0076CA	2100-CJ15T-0076CA	
			114 TB		2100-CK15T-0114CA	2100-CJ15T-0114CA	
			152 TB		2100-CK15T-0152CA	2100-CJ15T-0152CA	
			190 TB		2100-CK15T-0190CA	2100-CJ15T-0190CA	
		Bottom- mounted	76 TB		2100-CK15B-0076CA	2100-CJ15B-0076CA	
			114 TB		2100-CK15B-0114CA	2100-CJ15B-0114CA	
			152 TB		2100-CK15B-0152CA	2100-CJ15B-0152CA	
			190 TB		2100-CK15B-0190CA	2100-CJ15B-0190CA	
Neutral Connection Plate Unit (1)	0.25" x 2" x 12" copper tin plated bus plate with #6-250 kcmil lug (280 A capacity)			0.5	2100-BKNPC-05SF	2100-BJNPC-05SF	
	0.25" x 2" x 12" copper silver plated bus plate with #6-250 kcmil lug (280 A capacity)			0.5	2100-BKNPS-05SF	2100-BJNPS-05SF	PE
Surge Protective Device Unit (formerly known as TVSS) The SPD consists of an Allen-Bradley Bulletin 4983-DS with circuitry provided to monitor the status of all protection modes. Unit consists of a fused disconnect feeding a surge protective device (SPD) rated to provide a minimum of 80 kA per phase of surge current protection. The unit is provided with one green light as a status indicator. (Response time is 0.5 nS or less) SPD meets UL 1449 requirements. Refer to the Surge and Filter Protection publication 4983-BR001, for more information.	WYE power systems with a solidly grounded neutral 3-wire	480V L-L, 277V L-G (2)		0.5	2100-SPKB-1	2100-SPJB-1	SC
		208V L-L, 120V L-G (3)			2100-SPKH-1	2100-SPJH-1	PE
		380V L-L, 220V L-G (3)			2100-SPKN-1	2100-SPJN-1	
		400V L-L, 230V L-G (3)			2100-SPKKN-1	2100-SPJKN-1	
		415V L-L, 240V L-G (3)			2100-SPKI-1	2100-SPJI-1	
	WYE power systems with a solidly grounded neutral, 4-wire	480V L-L, 277V L-G, 277V L-N			2100-SPKB-3	2100-SPJB-3	
	WYE power systems with impedence grounded neutral or 3 Phase, 3 Wire Delta Power Systems	480V			2100-SPKB-2	2100-SPJB-2	SC
		240V			2100-SPKA-2	2100-SPJA-2	PE
		380V			2100-SPKN-2	2100-SPJN-2	
		400V			2100-SPKKN-2	2100-SPJKN-2	
		415V			2100-SPKI-2	2100-SPJI-2	
Corner Section	Use this catalog number to select a corner section with an MCC lineup. See page 32 for corner section description. Available as lug compartment, see page 84.			6.0	2100-CS60	2100-CS60	SC-II

(1) Neutral Connection Plate 0.5 SF Unit can only be used in sections with vertical wireway. **Not for use** in sections with full width frame mounted units, including all mains.When horizontal neutral bus is selected the cable connection from the neutral connection plate to the horizontal neutral plate is NOT provided.

(2) For systems with neutral bus (4-wire systems), use 2100-SP_B-3

(3) For systems with neutral bus (4-wire systems), contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Chapter 11

Factory-Installed Options, Modifications, Accessories for Contactors and Starters, Metering, Mains and Feeders, Lighting and Power Panels, Transformer, and Miscellaneous Units

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 117 -

Option	Description	FVC	FVR	FVNR	TS1W, TS2W	Option Number	Delivery Program
		2102L, 2103L	2106, 2107	2112, 2113	2122, 2123		
Push Buttons (1),(2),(3)	START-STOP (6)			✓		-1	SC
	FORWARD-OFF-REVERSE		✓				
	HIGH-LOW-STOP				✓		
	OFF	✓				-1B	
	STOP		✓	✓	✓		
	ON-OFF (6)	✓				-1E	
	FAST-SLOW-STOP				✓		
Push Buttons and Selector Switch (1),(2) (4)	HAND-ON, HAND-OFF, HAND-OFF-AUTO	✓				-1F (7)	
	HAND-START, HAND-STOP, HAND-OFF-AUTO			✓			
Control Station Housing (4) (5)	Blank	✓	✓	✓	✓	-2	
	1 hole—for one pilot device	✓	✓	✓	✓	-2A	
	2 holes—for two pilot devices	✓	✓	✓	✓	-2B	
	3 holes—for three pilot devices	✓	✓	✓	✓	-2C	
	4 holes—for four pilot devices	✓		✓		-2D (8)	
Selector Switch (1),(2) (4) (800H) (maximum one switch per unit)	HAND-OFF-AUTO	✓		✓		-3	SC
	FORWARD-OFF-REVERSE		✓ (3)				
	HIGH-LOW-OFF				✓ (3)		
	FAST-SLOW-OFF				✓	-3E (3)	
	OFF-ON	✓		✓			

(1) Push buttons cannot be used in conjunction with selector switches, except with option 1F. Generally, when more than three devices are selected, Bulletin 800F pilot devices are supplied. When three or less devices are selected, Bulletin 800T pilot devices are supplied except selector switches are Bulletin 800H devices. On 0.5 space factor units, Bulletin 800F pilot devices are supplied.

(2) Maximum of four pilot devices on 0.5 space factor units and maximum of three pilot devices on dual mounted units. Legend plates are available in French or Spanish at no additional cost by adding **860F** or **860S** to catalog string number.

(3) Mutually exclusive with DeviceNet communication modules, DeviceNet starter auxiliary (11DSA2, 11DSA3) and E3 solid-state overloads (7FEC_ _), E1 Plus solid state overload relay with DeviceNet communication module (7FEE_D), EtherNet/IP communication option (-ENET), and E300 Overload Options (-7FE3 or -7FE2).

(4) Not available with E300 Control or Diagnostic Stations.

(5) Available only on units without pilot devices. The control station on the dual 2103L or dual 2113 is a flat mounting plate, flush mounted to the door of the unit. Holes are for Bulletin 800T devices when unit is 1.0 space factor and larger. Holes are for Bulletin 800F pilot devices when unit is 0.5 space factor.

(6) Two Bulletin 800F pilot lights are supplied when two pilot lights are selected in conjunction with push buttons, separate or transformer control only. Only one 800T pilot light can be supplied on 2103L or 2113 dual units when push buttons are also selected.

(7) When option 1F is used with 11DSA_, 7FEE_D, 7FEC_, -ENET, -7FE2, or -7FE3, option 90 (1 N.O. auxiliary contact) is required (Important: required option code for Bulletin 2112 and 2113 vacuum contactor starter units is 900111).

(8) Not available for 1.0 space factor and larger units.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Pilot Lights (Non-Push-To-Test)

- Bulletin 800T pilot lights are transformer type, Bulletin 800F pilot lights are full-voltage type.
- When three or less devices are selected, pilot devices supplied are Bulletin 800T (800H for selector switches).
- When more than three devices are selected, pilot devices supplied are Bulletin 800F.
- On 0.5 space factor units, pilot devices supplied are Bulletin 800F, maximum of four pilot devices can be selected.
- On dual mounted units, pilot devices supplied are Bulletin 800T (800H for selector switches), maximum of three pilot devices may be selected.
- When selected, option 85T (Elapsed Time Meter) occupies the space of one Bulletin 800T (or 800H) pilot device or the space of two Bulletin 800F pilot devices, reducing the number of other devices which can be selected.
- Legend plates are available in French or Spanish, at no additional cost, by adding 860F or 860S to the catalog string.

Table 118 -

Description	FVC	FVR	FVNR	TS1W, TS2W	Incandescent Lamps(12)	LED Lamps(13)	Delivery Program
	2102L, 2103L	2106, 2107	2112, 2113	2122, 2123	Option Number(13)	Option Number(13)	
ON(1)	✓				-4_	-4L_	SC(14)
ON-OFF(2),(3)	✓				-4_ _	-4L_ _	
FORWARD-REVERSE(4)		✓			-4_ _	-4L_ _	
FORWARD-REVERSE-OFF(5)		✓			-4_ _ _	-4L_ _ _	
ON(6)			✓		-4_	-4L_	
ON-OFF(3),(7)			✓		-4_ _	-4L_ _	
HIGH-LOW(8),(9)				✓	-4_ _	-4L_ _	
FAST-SLOW(8),(9)				✓	-4E_ _	-4EL_ _	
HIGH-LOW-OFF(9),(10)				✓	-4_ _ _	-4L_ _ _	
FAST-SLOW-OFF(9),(10)				✓	-4E_ _ _	-4EL_ _ _	
OVERLOAD(11)		✓	✓(3)	✓	-4T_	-4TL_	

(1) When used with option 1F or 11DSA_, option 90 (N.O. auxiliary contact) must be selected.
When used with option 1F and 11DSA3, option 900 (two N.O. auxiliary contacts) must be selected.

(2) Option 91 (one N.C. auxiliary contact) must be selected.
When used with option 1F or 11DSA_, option 901 (one N.O. and one N.C. auxiliary contact) must be selected.
When used with option 1F and 11DSA3, option 9001 (two N.O. and one N.C. auxiliary contacts) must be selected.

(3) When ON and OFF or ON and OVERLOAD pilot lights are selected in conjunction with push buttons, and control type is separate control or transformer control, the pilot lights are Bulletin 800F pilot lights and the push buttons are Bulletin 800T.

(4) When used with option 11DSA_, 7FEC_, 7FE2, or 7FE3, option 90 (1 N.O. auxiliary contact) must be selected.

(5) Option 91 (one N.C. auxiliary contact) must be selected. When used with option 11DSA_, 7FEC_, 7FE2, or 7FE3, option 901 (one N.O. and one N.C. auxiliary contact) must be selected.

(6) When used with option 1F, 11DSA_, 7FEE_D, or 7FEC_, or -ENET, 7FE2, or 7FE3, option 90 (N.O. auxiliary contact) must be selected.
(Important: required option code for Bulletin 2112 and 2113 vacuum contactor starter units is 900111.)
When used with option 1F and 11DSA3, 7FEE_D, 7FEC_, -ENET, 7FE2, or 7FE3, option 900 (2 N.O. auxiliary contacts) must be selected.
(Important: required option code for Bulletin 2112 and 2113 vacuum contactor starter units is 900111.)

(7) Option 91 (one N.C. auxiliary contact) must be selected. When used with option 1F, 11DSA_, 7FEE_D, 7FEC_, -ENET, 7FE2, or 7FE3 option 901 (one N.O. and one N.C. auxiliary contact) must be selected. (Important: required option code for Bulletin 2112 and 2113 vacuum contactor starter units is 900111.) When used with option 1F and 11DSA3, 7FEE_D, or 7FEC_, or -ENET, 7FE2, or 7FE3, option 9001 (two N.O. and one N.C. auxiliary contacts) must be selected. (Important: required option code for Bulletin 2112 and 2113 vacuum contactor starter units is 900111.)

(8) When used with option 11DSA_ or 7FEE_DEE_D, option -90 (one N.O. auxiliary contact) must be selected.

(9) Not available on -7FE2 or -7FE3 Overload Relay Options.

(10) Option 91 (one N.C. auxiliary contact) must be selected.
When used with option 11DSA_ or 7FEE_DEE_D, option -901 (one N.O. and 1 N.C. auxiliary contact) must be selected.

(11) When a eutectic alloy overload relay is used, option 9 (N.O. overload relay auxiliary contact) must be selected. Not available with option 11DSA3, 7FEE_D 7FEC_, -ENET, 7FE2, or 7FE3.

(12) Bulletin 800F incandescent lamps are only available for 110…120V AC separate or transformer control.

(13) Option numbers are not complete, select pilot light lens color, add letters to the option number (A = amber, B = blue, C = clear, G = green, R = red, W = white) (for example, 4RG is a red ON and green OFF pilot light). Clear and white are not available for Bulletin 800T LED type pilot lights. White is not available on Bulletin 800F incandescent pilot lights. Clear is not available on Bulletin 800F LED pilot lights.

(14) SC delivery for 110…120V control voltage. PE delivery for 220…240V control voltage. Bulletin 800F pilot lights cannot be used with common (line voltage) control.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Pilot Lights (Push-To-Test)

- When selected, option 85T (Elapsed Time Meter) occupies the space of one Bulletin 800T (or 800H) pilot device or the space of two Bulletin 800F pilot devices, reducing the number of other devices which can be selected.
- Bulletin 800T pilot lights are transformer type, Bulletin 800F pilot lights are full-voltage type.
- When three or less devices are selected, pilot devices supplied are Bulletin 800T (800H for selector switches).
- When more than three devices are selected, pilot devices supplied are Bulletin 800F.
- On 0.5 space factor units, pilot devices supplied are Bulletin 800F, maximum of four pilot devices can be selected.
- On dual mounted units, pilot devices supplied are Bulletin 800T (800H for selector switches), maximum of three pilot devices can be selected.
- Legend plates are available in French or Spanish, at no additional cost, by adding 860F or 860S to the catalog string.

Table 119 -

Description	FVC	FVR	FVNR	TS1W, TS2W	Incandescent Lamps[12]	LED Lamps	Delivery Program
	2102L, 2103L	2106, 2107	2112, 2113	2122, 2123	Option Number[13]	Option Number[13]	
ON[1]	✓				-5_	-5L_	SC[14]
ON-OFF[2],[3]	✓				-5_ _	-5L_ _	
FORWARD-REVERSE[4]		✓			-5_ _	-5L_ _	
FORWARD-REVERSE-OFF[5]		✓			-5_ _ _	-5L_ _ _	
ON[6]			✓		-5_	-5L_	
ON-OFF[3],[7]			✓		-5_ _	-5L_ _	
HIGH-LOW[8],[9]				✓	-5_ _	-5L_ _	
FAST-SLOW[8],[9]				✓	-5E_ _	-5EL_ _	
HIGH-LOW-OFF[9],[10]				✓	-5_ _ _	-5L_ _ _	
FAST-SLOW-OFF[9],[10]				✓	-5E_ _ _	-5EL_ _ _	
OVERLOAD[11]		✓	✓[1]	✓	-5T_	-5TL_	

(1) When used with option 1F or 11DSA_, option 90 (N.O. auxiliary contact) must be selected.
When used with option 1F and 11DSA3, option 900 (two N.O. auxiliary contacts) must be selected.

(2) Option 91 (one N.C. auxiliary contact) must be selected.
When used with option 1F or 11DSA_, option 901 (one N.O. and one N.C. auxiliary contact) must be selected.
When used with option 1F and 11DSA3, option 9001 (two N.O. and one N.C. auxiliary contacts) must be selected.

(3) When ON and OFF or ON and OVERLOAD pilot lights are selected in conjunction with push buttons, and control type is separate control or transformer control, the pilot lights are Bulletin 800F pilot lights and the push buttons are Bulletin 800T.

(4) When used with option 11DSA_, 7FEC_, 7FE2, or 7FE3, option 90 (1 N.O. auxiliary contact) must be selected.

(5) Option 91 (one N.C. auxiliary contact) must be selected.
When used with option 11DSA_, 7FEC_, 7FE2, or 7FE3, option 901 (one N.O. and one N.C. auxiliary contact) must be selected.

(6) When used with option 1F, 11DSA_, 7FEE_D, 7FEC_, -ENET, 7FE2, or 7FE3, option 90 (N.O. auxiliary contact) must be selected.
(Important: required option code for Bulletin 2112 and 2113 vacuum contactor starter units is 900111.)
When used with option 1F and 11DSA3, 7FEE_D, 7FEC_ -ENET, 7FE2, or 7FE3, option 900 (2 N.O. auxiliary contacts) must be selected.
(Important: required option code for Bulletin 2112 and 2113 vacuum contactor starter units is 900111.)

(7) Option 91 (one N.C. auxiliary contact) must be selected.
When used with option 1F, 11DSA_, 7FEE_D, 7FEC_, -ENET, 7FE2, or 7FE3 option 901 (one N.O. and one N.C. auxiliary contact) must be selected.
(Important: required option code for Bulletin 2112 and 2113 vacuum contactor starter units is 900111.)
When used with option 1F and 11DSA3, 7FEE_D, 7FEC_, -ENET, 7FE2, or 7FE3, option 9001 (two N.O. and one N.C. auxiliary contacts) must be selected.
(Important: required option code for Bulletin 2112 and 2113 vacuum contactor starter units is 900111.)

(8) When used with option 11DSA_ or 7FEE_DEE_D, option -90 (one N.O. auxiliary contact) must be selected.

(9) Not available on -7FE2 or -7FE3 Overload Relay Options.

(10) Option 91 (one N.C. auxiliary contact) must be selected.
When used with option 11DSA_ or 7FEE_DEE_D, option -901 (one N.O. and one N.C. auxiliary contact) must be selected.

(11) When a eutectic alloy overload relay is used, option 9 (N.O. overload relay auxiliary contact) must be selected. Not available with option 11DSA3, 7FEE_D, 7FEC_, -ENET, 7FE2, or 7FE3.

(12) Bulletin 800F incandescent lamps are only available for 110…120V AC separate or transformer control.

(13) Option numbers are not complete, select pilot light lens color, add letters to the option number
(A = amber, B = blue, C = clear, G = green, R = red, W = white) (for example, 4RG is a red ON and green OFF pilot light).
Clear and white are not available for Bulletin 800T LED type pilot lights. White is not available on Bulletin 800F incandescent pilot lights. Clear is not available on Bulletin 800F LED pilot lights.

(14) SC delivery for 110…120V control voltage. PE delivery for 220…240V control voltage. Bulletin 800F pilot lights cannot be used with common (line voltage) control.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 120 -

Option	Option Number	Description	Size or Rating	FVC	Size or Rating	FVR	FVNR	TS1W TS2W	Main 2193M	Delivery Program
				2102L 2103L		2106 2107	2112 2113	2122 2123		
				VA		VA	VA	VA		
Control Circuit Transformer (with grounded and fused secondary)	-6P (1)	Standard capacity with primary fusing	30 A	80 (5)	1	80	80 (5)	80	—	SC
			60 A	80	2	80	80	80	—	
			100 A(4)	200	3	200	200	200	—	
			200 A	250	4	250	250	250	—	
			300 A	350	5	350	350	350	—	
			—	—	6	—	80	—	—	
			—	—	200 A and 400 A	—	250	—	—	
			—	—	600A	—	500	—	—	
	-6P_ (2)	Standard capacity with primary fusing for 3000AT 100% rated mains	—	—	—	—	—	—	500	PE
	-6XP (3),(1)	100 watt extra capacity with primary fusing	30 A	130	1	130	130	130	—	SC
			60 A	130	2	130	130	130	—	
			100 A(4)	250	3	250	250(6)	250	—	
			200 A	350	4	350	350	350	—	
			300 A	500	5	500	500	500	—	
			—	—	6	—	130	—	—	
			—	—	200 A and 400 A	—	350	—	—	
			—	—	600 A	—	750	—	—	

(1) When a control circuit transformer is selected on dual 2103L and 2113 units, one auxiliary contact mounting position (P3) is given up for the transformer secondary fuse.
(2) Catalog number listed is not complete. Select voltage code from Table 121.
(3) Not available on 0.5 space factor units.
(4) For 100 A 2103L units, increase space factor from 1.5 to 2.0.
(5) For 0.5 space factor 2102L, 2103L, 2112 and 2113, standard capacity VA rating is 75VA.
(6) For 2113 Size 3 increase space factor from 1.5 to 2

Table 121 - Line Voltage

Line Voltage	Voltage Code
208	H
240	A
380	N
400	KN
415	I
480	B
600	C

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Electronic Overload Relays

IMPORTANT All EtherNet/IP network orders require an Electronic Overload module.

Table 122 -

Option	Option Number	Description		FVR	FVNR	TS1W TS2W	Delivery Program
				2106, 2107	2112, 2113	2122, 2123	
E1 Plus Electronic Overload Relay (1),(2)	-7FEE_ (7)	Selectable trip class (10, 15, 20, 30) selectable Auto/Manual-Auto reset electronic overload relay for NEMA starters, Size 1…6.	NEMA Size 1, 2	✓	✓		SC
					✓dual(11), (17)	✓(17)	
			NEMA Size 3	✓	✓		
						✓(17)	
			NEMA Size 4	✓(8)	✓(12)		
			NEMA Size 5	✓	✓		
			NEMA Size 6		✓		
		Vacuum Contactor Starters	200 A, 400 A, 600 A		✓		
E1 Plus Electronic Overload Relay with DeviceNet module (1),(2),(3) (4)	-7FEE_D (7)	Selectable to class (10, 15, 20, 30) selectable Auto/Manual-Auto reset electronic overload relay NEMA starters, Size 1…6. Includes DeviceNet module with two 24V DC inputs and one 110…240V AC output.	NEMA Size 1, 2		✓		
						✓(17)	
			NEMA Size 3		✓		
						✓(17)	
			NEMA Size 4		✓(12)		
			NEMA Size 5		✓		
			NEMA Size 6		✓		
		Vacuum Contactor Starters	200 A, 400 A, 600 A		✓		
E1 Plus Electronic Overload Relay with Ground Fault Protection Module & Jam Protection (1),(2),(5),(6)	-7FEE_G (7)	Selectable to class (10, 15, 20, 30) selectable Auto/Manual-Auto reset electronic overload relay for NEMA starters, Size 1…6. Includes Ground Fault Protection Module with integral Jam Protection and external Ground Fault Sensor.	NEMA Size 1, 2	✓	✓(13)		
			NEMA Size 3	✓(9)	✓(9)		
			NEMA Size 4	✓(10)	✓(14)		
			NEMA Size 5	✓	✓(15)		
			NEMA Size 6	✓	✓(16)		
		Vacuum Contactor Starters	200 A		✓		
			400 A, 600 A		✓		

Table is continued on the next page.

Table 122 -

Option	Option Number	Description		FVR	FVNR	TS1W TS2W	Delivery Program
				2106, 2107	2112, 2113	2122, 2123	
E1 Plus with Jam Protection Module (1),(2),(11)	7FEE_J (7)	Selectable trip class (10, 15, 20, 30) selectable Auto/Manual-Auto reset electronic overload relay for NEMA starters, size 1…6 with Jam Protection Module	NEMA Size 1, 2	✓	✓(13)		SC
					✓dual(11), (17)	✓(17)	
			NEMA Size 3	✓	✓		
						✓(17)	
			NEMA Size 4	✓(8)	✓(12)		
			NEMA Size 5	✓	✓		
			NEMA Size 6		✓		
		Vacuum Contactor Starters	200 A, 400 A, 600 A		✓		

(1) Options -7FEE_, 7FEE_D, 7FEE_G and 7FEE_J are supplied with one N.O. and one N.C. auxiliary contact.
(2) Options -7FEE_, 7FEE_D, 7FEE_G and 7FEE_J are mutually exclusive with each other and E3 overload relay options.
(3) Mutually exclusive with 89_ relay and 87_auxiliary timer options. Not available with pushbuttons or selector switches, except 3 and 1F are allowed for Bulletin 2112 and 2113. Separate or transformer control only. Not available with option 11DSA2 or 11DSA3.
(4) Not available on IntelliCENTER MCC with EtherNet/IP network orders.
(5) Not available on dual starter units or with option 85XA (current transformer), 85AA (ammeter) or 700TC_ (current transducer).
(6) Available for separate, transformer, or line-to-neutral control only; not available with common control.
(7) Option number is not complete: Select overload relay code from appropriate table on page 151 and add to option number (for example, 7FEE**B**).
(8) Bulletin 2106 NEMA Size 4 is increased to 4.5 space factor.
(9) NEMA size 3, power terminal blocks must be supplied. Not available with Type A wiring or option 106 (omission of power terminal blocks).
(10) Bulletin 2107, NEMA Size 4 with circuit breaker is increased to 4.5 space factor.
(11) Not available on NEMA Size 2 dual units.
(12) Bulletin 2112 NEMA 4 with Class J or HRCII-C fuses is increased to 3.0 space factor. Bulletin 2113 Size 4 with circuit breaker option -TGM requires 3.0 space factor.
(13) Not available on 0.5 space factor units with option 11DSA2 or 11DSA3.
(14) Bulletin 2112, NEMA Size 4 is increased to 3.5 space factor. Bulletin 2113, NEMA Size 4 with circuit breaker suffix TJA is increased to 2.5 space factors.
(15) Bulletin 2112, NEMA Size 5 with Class J fuse clips is increased to 4.0 space factor.
(16) Not available for 200 HP at 240V or 400 HP at 480V.
(17) For 2-speed starter and dual mounted starter units, there are two overload option codes required (for example, 7FEE**E**EE**B**, with DeviceNet module 7FEE**E**DEE**B**D, with Jam Protection module 7FEE**E**JEE**B**J).
For 2-speed applications, the first code denotes the high speed overload relay and the second code denotes the low speed overload relay.
For dual unit applications, the first code denotes the left-side overload relay, the second code denotes the right-side overload relay.

Table 123 - Overload Relay Codes for E1 Plus, Option -7FEE_ ,-7FEE_D, -7FEE_G, or 7FEE_

For Use with NEMA Size	Full Load Current Range (Amperes)	Overload Relay Code (Add to Option Number from 149 [for example, 7FEE**B**]) (4)
1(1)	0.2…1.0	B
	1.0…5.0	C
	3.2…16	D
	5.4…27	E
2(2)	9…45	F
3	18…90	G
4	30…150	H
5	60…300	J
6	120…600	K
200 A Vacuum Contactor Starter	40 …200	L
400 A Vacuum Contactor Starter(3)	60…300	J
400 A Vacuum Contactor Starter(3)	100…500	M
600 A Vacuum Contactor Starter	120…600	K

(1) Not available on NEMA Size 1 dual units when option 7FEE_**G** (ground fault protection) is used.

(2) Not available on NEMA Size 2 dual units.

(3) 400 A Vacuum Contactor Starters use code 'J' except 125 HP at 208V, 125…150 HP at 240V, 250 HP at 380…415V, 250…300 HP at 480V, and 350…400 HP at 600V use code 'M'

(4) For 2-speed starter and dual mounted starter units, there are two overload option codes required (for example, 7FEE**E**EE**B**, with DeviceNet module 7FEE**E**DEE**B**D, with Jam Protection module 7FEE**E**JEE**B**J). For 2-speed applications, the first code denotes the high speed overload relay and the second code denotes the low speed overload relay. For dual mounted starter units, the first code denotes the overload relay for the left-hand starter, the second code denotes the overload relay for the right-hand starter. If a DeviceNet module or Jam protection module is selected, it must be added to both overload relay codes and be the same option, either DeviceNet or Jam protection for both codes.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order**.**

IMPORTANT All EtherNet/IP network orders require an Electronic Overload module.

Table 124 -

Option	Option Number	Description		FVC	FVR	FVNR	TS1W TS2W	Delivery Program
				2102L 2103L	2106 2107	2112 2113	2122 2123	
E3 Electronic Overload Relay (1),(2) For non-DeviceNet applications a separate 24V DC power source is needed. You can use a Bulletin 193-DNCT for programming and monitoring. Refer to publication, 193-UM002.	-7FEC1_ (3), (4)	E3 Basic is provided with two 24V DC inputs and one 110…240V AC output.	NEMA size 1			✓(11)		SC
			NEMA size 2			✓(12)		
			NEMA size 3			✓		
			NEMA size 4			✓(13)		
			NEMA size 5			✓		
			NEMA size 6			✓		
			Vacuum Contactor Starters			✓		
	-7FEC2_ (3), (4)	E3 Plus is provided with four 24V DC inputs and two 110…240V AC outputs.	NEMA size 1		✓	✓(11)		
			NEMA size 2		✓	✓(12)		
			NEMA size 3		✓	✓		
	7FEC3_ (3), (4), (5)	E3 Plus is provided with four 24V DC inputs and two 110…240V AC outputs.	NEMA size 4		✓(8)	✓(13)		
			NEMA size 5		✓	✓		
			NEMA size 6			✓		
			Vacuum Contactor Starters			✓		
	-7FEC5_ (3), (4), (6), (7)	With Voltage Protection and Energy Monitoring. Provided with six 24V DC inputs and two 110…240V AC outputs.	NEMA size 1		✓(9)	✓(11)		
			NEMA size 2		✓(10)	✓(12)		
			NEMA size 3		✓	✓(14)		
			NEMA size 4		✓(8)	✓(13)		
			NEMA size 5		✓	✓		
			NEMA size 6			✓		

(1) Outputs are rated NEMA B300 (3 A at 120V AC and 1.5 A at 240V AC). Not available with common (line voltage) control. Not available with Type A wiring. Not available on dual 2113, 0.5 space factor 2112 and 0.5 space factor 2113 units.

(2) Mutually exclusive with E1 Plus overload relays (options -7FEE_, 7FEE_D, 7FEE_G and 7FEE_J). Mutually exclusive with option 9 and 9A, 11DSA_, 18, 84A1, 85XA & 85AA, 87_, 89_, and 700TC_.

(3) Catalog numbers listed are not complete:
- Select overload relay code from table below and add to option number (for example, 7FEC2**B**).
- For NEMA size 1…3 overload relays, if 120V AC inputs are required, place a 'Y' configuration option in the catalog string number as in table below (for example, 7FEC2B**Y**).
- If applicable for NEMA size 4…6 and vacuum contactor starters, select an E3 overload relay configuration option from table below and add to option number (for example, 7FEC3F**Y**, 120VAC input points).

(4) See I/O counts in Table 136.

(5) NEMA size 1…3 E3 Plus overload relays have ground fault sensor as standard. NEMA size 4…6 E3 Plus overload relays and vacuum contactor starters need to have the ground fault configured to include a ground fault sensor. Refer to Table 126 for ground fault sensor options.

(6) E3 Plus overload relay option 7FEC5_ does not include integral ground fault sensor. For units with E3 overload relay option 7FEC5_, if ground fault protection is required, the ground fault sensor must be added. Refer to Table 126 for ground fault sensor options.

(7) 2.5 space factor required when selecting Bulletin 2113 Size 4 Starter.

(8) Bulletin 2106, NEMA Size 4 is increased to 4.5 space factors.

(9) Bulletin 2106, NEMA Size 1 with Class J, H, R or HRCII-C fuses is increased to 2.0 space factors. Bulletin 2106, NEMA Size 1 with Class CC fuses is 1.5 space factor.

(10) Bulletin 2106, NEMA Size 2 is increased to 2.0 space factors.

(11) NEMA size 1 2112/2113 1.0 space factor units are limited to 10 control terminal points and 3 power terminal points. When option 106 (eliminate power terminals) is used, up to 15 control terminal points are available. For 20 control terminal points, add 0.5 space factor.

(12) NEMA size 2 2112/2113 1.0 space factor units are limited to 10 control terminal points and 3 power terminal points. Option 106 (eliminate power terminals) is not available for NEMA size 2 2112/2113 units. For 15…20 control terminal points, add 0.5 space factor.

(13) Bulletin 2112, NEMA Size 4, with Class J or HRCII-C fuses are increased to 3.0 space factors. Bulletin 2113, NEMA Size 4, with circuit breaker suffix TGM is increased to 3.0 space factors.

(14) Bulletin 2113, NEMA Size 3 with transformer control (Option 6P or 6XP) is increased to 2.0 space factors.

Table 125 - Overload Relay Codes for E3 and E3 Plus, Option 7FEC_

For use with NEMA Size	Full Load Current Range (Amperes)	Overload Relay Code (Add to Option Number [for example, 7FEC1A])
1	0.4…2.0	P
	1…5	A
	3…15	B
	5…25	C
2	9…45	D
3	18…90	E
4	28…140	F
5	60…302	H
6	125…630	K
200 A Vacuum Contactor Starter	42…210	G
400 A Vacuum Contactor Starter(1)	60…302	H
400 A Vacuum Contactor Starter(1)	84…420	M
600 A Vacuum Contactor Starter	125…630	K

(1) 400 A Vacuum Contactor Starters use code 'H' except 125 HP at 208V, 125…150 HP at 240V, 250 HP at 380…415V, 250…300 HP at 480V, and 350…400 HP at 600V use code 'M'.

Table 126 - E3 Overload Relay Configuration Options

Description	Overload Relay Code (Add to option number [for example, 7FEC3FYG])	Unit Size
24V DC input points	None	All
120V AC input points, available for 110-120V AC control voltage only	Y(1), (2)	All
Ground fault. Includes Bulletin 193-CBCT_ ground fault sensor.	G (3),(4)	1, 2(5)
		3(5)
		4, 5, 6(6)
120V AC input points and ground fault (see description above)	YG (1),(2), (3),(4)	1, 2(5)
		3(5)
		4, 5, 6(6)

(1) When 120V AC inputs are selected (Overload Relay Code Y or YG) with Option 7FEC5_ only 4 inputs points are available.
(2) Bulletin 2112/2113, NEMA Size 2 with Option 7FEC5_Y or 7FEC5_YG are increased to 1.5 space factor.
(3) Bulletin 2112, NEMA Size 4 is increased to 3.5 space factor.
Bulletin 2113, NEMA Size 4 with circuit breaker suffix TJA is increased to 2.5 space factors.
Bulletin 2112, NEMA Size 5 with Class J fuse clips is increased to 4.0 space factor.
Bulletin 2112, NEMA Size 5, with Class J fuses is increased to 4.0 space factors.
(4) NEMA Size 3 with ground fault option must include power terminal blocks, therefore wiring type must be Type B and unit is not allowed to have omit power terminal blocks (option 106).
(5) Only available with option -7FEC5.
(6) Not available with option -7FEC1.

Table 127 - Catalog Explanation for E300 Electronic Overload Relay

-7FE3	E	J	CN	3C	C	DD
Type	Communication	Voltage	Control Module	Sensing Module	Operator Station	Expansion Module
Table 128	Table 129	Table 130	Table 131	Table 132	Table 133	Table 134

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 128 - Solid State Overload Type

Option	Option Number	Description	FVC	FVR	FVNR	TS1W, TS2W	2193M 2193F
			2102L, 2103L	2106, 2107	2112, 2113	2122, 2123	
E300 Electronic Overload Relay	-7FE2(1)(2)(3)(4)	E200 - Parameter Only Overload		X	X		X(5)
	-7FE3(1)(2)(3)	E300 - Communication Based Overload		X	X		X(5)

(1) Outputs are rated NEMA B300 (3 A at 120V AC and 1.5 A at 240V AC). Not available with common (line voltage) control. Not available with Type A wiring. Not available on dual units. Not available in Space Saving.
(2) Mutually exclusive with all other overload options. Mutually exclusive with option 9 and 9A, 11DSA_, 18, 84A1, 85XA and 85AA, 87_, 89_, and 700TC_.
(3) Catalog options are not complete. An option from each table in Table 129. . .Table 135 is required to add an E300 Electronic Overload Relay.
(4) Launch date to be determined.
(5) Not Available Until CR3.

Table 129 - E300 Overload Relay Communication Option

Code	Communication Option
X(1), (2)	No Communication Option
D(2)	DeviceNet
E	EtherNet/IP

(1) Required with -7FE2. Mutually exclusive with -7FE3.
(2) Launch date to be determined.

Table 130 - E300 Overload Relay Voltage Code

Code	Voltage Code
D(1)	120V AC
J(2)	24V DC

(1) Mutually exclusive with all 220-240V control voltage types.
(2) Surge suppressor (-17) required. Suppressor provided is RC snubber.

Table 131 - E300 Overload Relay Control Module

Code	Control Module
CN	Control Only (6 In/3 Out w/24V DC; 4 In/3 Out w/AC Voltages)
GN(1), (2), (3)	Ground Fault & PTC (4 In/ 2 Out w/24V DC; 2 In/2 Out w/AC Voltages)
GT(1), (2), (3)	Ground Fault & PTC (4 In/ 2 Out w/24V DC; 2 In/2 Out w/AC Voltages) - Includes Bulletin 193-CBCT_ ground fault sensor.

(1) When used on 2106 and 2107, option requires Digital Expansion Module.
(2) Operator Stations and Expansion Modules can not be added to the same unit. E300 Power Supply required that is available in CR3.
(3) Electronic Reset (Option R) is not available with this option for Bulletins 2112 and 2113 with 120V Control (Option D). Any CB auxilliary is not wired to E300 Input when any selector switch option is selected.

Table 132 - E300 Overload Relay Sensing Module

Code	Sensing Module
3C	0.5…30 A Current Only
3G	0.5…30 A Current/Ground Fault
3V	0.5…30 A Current/Ground Fault/Voltage
5C	0.5…30 A Pass-thru Current Only
5V	0.5…30 A Pass-thru Current/Voltage
6C	6…60 A Current Only
6G	6…60 A Current/Ground Fault
6V	6…60 A Current/Ground Fault/Voltage
1C	10…100 A Current Only
1G	10…100 A Current/Ground Fault
1V	10…100 A Current/Ground Fault/Voltage
2C(1)	20…200 A Current Only
2G(1)	20…200 A Current/Ground Fault
2V(1)	20…200 A Current/Ground Fault/Voltage

(1) Not Available Until CR3.

Table 133 - E300 Overload Relay Operator Station

Code	Operator Station
X(1)	No Operator Station
C(2) (3) (4)	Control Station
D(2) (3) (4)	Diagnostic Station
R(2)	Electronic Reset

(1) Requires Enclosure code K or J for Bulletin 2106, 2107, 2112 or 2113 units.
(2) Requires Enclosure code A or D for Bulletin 2106, 2107, 2112 or 2113 units.
(3) Control and Diagnostic Operator Stations are mutually exclusive with all push button, pilot light, selector switch, and control station options.
(4) Operator Stations and Expansion Modules can not be added to the same unit. E300 Power Supply required that will be available in CR3.

Table 134 - E300 Overload Relay Expansion Module

Code	Expansion Module
--	None Selected
DD(1) (2)	120V AC Digital I/O Module
DJ(1) (2)	24V DC Digital I/O Module

(1) Not Available Until CR3. Available on Bulletin 2106 and 2107 with GN or GT Control Module Option.
(2) Operator Stations and Expansion Modules can not be added to the same unit. E300 Power Supply required that will be available in CR3.

Table 135 - E300 Overload Relay Expansion Bus Power Supply

Code	Expansion Bus Power Supply
--	None Selected
PD(1)	120V AC Power Supply
PJ(1)	24V DC Power Supply

(1) Not Available Until CR3.

Table 136 - E3 / E3 Plus / E300 Digital Expansion I/O

E3 / E3 Plus Overloads			E300 Overloads									
E3 / E3 Plus	24V DC Control		E300 Control Module Option	120V AC Control				24V DC Control			
	Inputs	Outputs		Inputs		Outputs		Inputs		Outputs	
E3	2	1	CN – Standard Control Module	4		3		6		3	
E3 Plus	4	2	GN / GT – Ground Fault and PTC Control Module	FVNR	FVR	FVNR	FVR	FVNR	FVR	FVNR	FVR
				2	6(1)	2	4(1)	4	8(1)	2	4(1)

(1) I/O count includes expansion module I/O points

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order**.**

Table 137 -

Option	Option Number	Description		FVC 2102L 2103L	FVR 2106 2107	FVNR 2112 2113	TS1W TS2W 2122 2123	Feeder /Main 2192 2193	2100-ESW	Delivery Program
Overload Relay Auxiliary Contact (Eutectic Alloy) (one contact per overload relay) (1)	-9	Normally Open	Type A Wiring		✓	✓				SC
							✓			
			Type B Wiring		✓	✓				
							✓			
	-9A	Normally Closed	Type A Wiring		✓	✓				
							✓			
			Type B Wiring		✓	✓				
							✓			
DeviceNet Starter Auxiliary (DSA) (2),(3) (4)	-11DSA2	For use with contactors and starters to provide DeviceNet inputs and outputs. **Four 120V** inputs and two 120V outputs. Available for 110…120V control only.		✓	✓	✓	✓	✓ (15),(16), (17)		
	-11DSA3	For use with contactors and starters to provide DeviceNet inputs and outputs. **Four 24V DC** inputs and two 240V AC (max), 30V DC (max) outputs. Available for 110…120V AC or 220…240V AC control voltage.		✓	✓	✓	✓	✓ (16),(17)		
Overload EtherNet/IP Communication Module(5) (6)	-ENET(8)	For use on starters to provide EtherNet/IP communication for the Electronic Overload Relay.	E1 Plus			✓(14)				
			E3 and E3 Plus		✓(13)	✓(14)				
ArcShield	-112A	Make the unit ArcShield compatible.		✓	✓	✓	✓	✓	✓ (18)	PE
Additional Unit Space	-15	Adds 0.5 space factor unit space to Bulletin 2112 and 2113 size 1, 2, and 3 units. **Important:** Bulletin 2112 and 2113, sizes 1 and 2, cannot be increased from 1.5 to 2.0 space factors by selecting option 15, nor can size 1 increase from 0.5 to 1.0 space factor by using option 15.				✓			✓ (18) (19) (20)	SC

Table is continued on the next page.

Table 137 -

Option	Option Number	Description	FVC	FVR	FVNR	TS1W TS2W	Feeder /Main	2100-ESW	Delivery Program
			2102L 2103L	2106 2107	2112 2113	2122 2123	2192 2193		
Filters for Door Vents	-16A	Filters for door vents on NEMA Type 1 and NEMA Type 1 with gasket Bulletin 2195, 2196 and 2197 units	Available on NEMA Type 1 and NEMA Type 1 with gasket Bulletins 2195, 2196, and 2197 only						SC
Surge Suppressor (7)	-17 (9)	On coil, one per contactor, for starters and contactors, not available on vacuum type, selection of this option requires the selection of -17R if an option relay (89___) is also selected.	✓		✓				
				✓		✓			
	-17R	For units with interposing relays (89CB and 89CBL) and unwired control relays (89CF and 89P), can only be used if option relay (89___) is selected. Selection of this option requires selection of option -17. Except when 89CBL or Common Control is selected.	✓		✓				
				✓		✓			
O/L Contact on Left Side of Circuit	-18 (10)	Moves overload trip contact from right (grounded) side of the control circuit to left (power input) side of control circuit.		✓	✓	✓			
Omit Wiring	-19	Omission of control wiring (11) (12)	✓	✓	✓	✓			
Control Circuit Fuse	-21	One control circuit fuse for separate control or line to neutral control	✓	✓	✓	✓			
	-22	Two control circuit fuses for common control	✓	✓	✓	✓			PE

(1) Options 9 and 9A are mutually exclusive and not available with optional overload relays (-7F_ _ _).
(2) Not available for dual 2103L or dual 2113 units. Not available for 0.5 space factor 2103L units. Not available for 0.5 space factor 2112 or 0.5 space factor 2113 units with E1 Plus with ground fault/jam protection (option 7FEE_G) or E1 Plus with jam protection (option 7FEE_J). Not allowed for 0.5 space factor 2113 units with eutectic overload relay. Mutually exclusive with 89_ relay and 87 timer options. Not available with push buttons or selector switches, except options 3 and 1F are allowed for Bulletin 2102L, 2103L, 2112 and 2113.
(3) DeviceNet options 11DSA2 and 11DSA3 are mutually exclusive. Not available with 7FEE_D. Mutually exclusive with E3 overload relays, option 7FEC_ and E300 overload relays, option 7FE2 and 7FE3.
(4) DSA option is not allowed on 2193FZ-B and 2193FZ-C due to the addition of the lug pad.
(5) Mutually exclusive with E1 Plus options -7FEE_D, -7FEE_G, and -7FEE_J.
(6) Required on IntelliCENTER MCC with EtherNet/IP network orders with E3 overload relays, option -7FEC_ _.
(7) Available for 110…240V control voltage. SC delivery for 110…120V control voltage. PE delivery for 220…240V control voltage. Not available for common control.
(8) Not available with option 7FE2 or 7FE3, or eutectic overload relays.
(9) Options 17 and 89CBL are mutually exclusive.
(10) Not available with option -7FEC_ _ ,-7FE3, or -7FE2..
(11) Except primary wiring to control transformers. On units where the control transformer is inaccessible (for example, installed under a mounting bracket), the transformer secondary 'x1' is wired to the transformer secondary fuse and the transformer secondary 'x2' is grounded and wired to the coil on Bulletin 2102 or 2103 units, to the coil on the starter units when option -18 is selected, to the normally closed overload relay auxiliary contact on the starter units when option -18 is not selected.
(12) On units with E300 overload relay, the external reset (option R) is always wired and with separate control E300 overload relay is wired to control circuit fuse.
(13) 2.0 space factor minimum when selected on Bulletin 2106 and 2107 size 1 or 2.
(14) Not available with dual units.
(15) A 120/240V AC source must be provided.
(16) Bulletins 2192F and 2192M require option 98 (external N.O. auxiliary contact). Bulletins 2193F and 2193M require option 98 (N.O. external auxiliary contact) or -790K (G, H, and J) and -790A (all other frames) (N.O. internal auxiliary contact).
(17) Not available with dual 2192F units.
(18) Only available with non-wireway switch units.
(19) Available in CR2.
(20) Delivery Program is PE.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 138 -

Option	Option Number	Description		FVC	FVR	FVNR	TS1W TS2W	Delivery Program
				2102L 2103L	2106 2107	2112 2113	2122 2123	
Blown Fuse Indicator Lights	-4BF	Option 4BF is valid only when 480V and 600V Power Factor Correction Capacitor is selected				✓		PE-II
480V and 600V Power Factor Correction Capacitors (1), (2), (3) (Refer to Power Factor Correction Capacitors for CENTERLINE 2100 MCC Starter Units, publication 2100-AT001, for more information)	-30KV	2…40 kVAR in 0.5 space factor. (4) 42.5…50 kVAR in 1.0 space factor.(4) Do not use these capacitors on motors subject to plugging or jogging. Do not subject capacitors to repetitive switching where capacitors and motors can be reenergized too quickly after being de-energized. Do not install capacitors in any vertical section that contains a variable frequency drive. Capacitors are mounted in separate unit with a separate door. This unit is located below selected starter. Door interlock is included. Three phase power fuses are included. Capacitors are factory wired to load side of the contactor and on the line side of the overload relay.	2 kVAR			✓		
	-31KV		2.5 kVAR			✓		
	-32KV		3 kVAR			✓		
	-33KV		4 kVAR			✓		
	-34KV		5 kVAR			✓		
	-35KV		6 kVAR			✓		
	-36KV		7 kVAR			✓		
	-37KV		7.5 kVAR			✓		
	-38KV		8 kVAR			✓		
	-39KV		9 kVAR			✓		
	-40KV		10 kVAR			✓		
	-41KV		11 kVAR			✓		
	-42KV		12.5 kVAR			✓		
	-43KV		13.5 kVAR			✓		
	-44KV		15 kVAR			✓		
	-45KV		16 kVAR			✓		
	-46KV		17.5 kVAR			✓		
	-47KV		18 kVAR			✓		
	-48KV		20 kVAR			✓		
	-49KV		22.5 kVAR			✓		
	-50KV		25 kVAR			✓		
	-51KV		27.5 kVAR			✓		
	-52KV		30 kVAR			✓		
	-53KV		32.5 kVAR			✓		
	-54KV		35 kVAR			✓		
	-55KV		37.5 kVAR			✓		
	-56KV		40 kVAR			✓		
	-57KV		42.5 kVAR			✓		
	-58KV		45 kVAR			✓		
	-59KV		50 kVAR			✓		

(1) See option 4BF for optional blown fuse indicators. Not available on dual starters, 0.5 space factor units, 6.0 space factor units or Space Saving NEMA units or vacuum contactor starters. Refer to Recommended Capacitor Size table in Appendix for suggested capacitor ratings.

(2) For applications other than motor applications connected to the load side of the starter or for those applications outlined in publication 2100-AT001, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

(3) Not available with overload option -7FE2 and -7FE3 until CR2.

(4) At 600V, 37.5 kVAR to 50 kVAR are 1.0 space factor.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 139 -

Option	Option Number	Description		FVC	FVR	FVNR	TS1W TS2W	2100-ESW	Delivery Program
				2102L 2103L	2106 2107	2112 2113	2122 2123		
Grounded Unit Door	-79GD	Hinge mounted ground strap mounted on bottom hinge of unit door. Unit door hinge grounding strap for IEC requirements.		Available on all units					SC
Unit Load Connector	-79L	Select on all plug-in units in sections with vertical unit load ground bus. Provides ground connection at unit location for cable size# 14-4 AWG	Unplated copper	Available on all plug-in units					
	-79LT(10)		Tin plated copper						
Unit Ground Stab	—	Copper unit ground stabs also may be used with steel vertical ground bus. Select on plug-in units in sections with vertical plug-in ground bus.	Copper alloy	Available on all plug-in units					
	-79U		Unplated copper						
	-79UT(10)		Tin plated copper						
Thermistor Protection Relay(1),	-84A1	Bulletin 817-E2P, 110…120V AC, 50/60 Hz, output is unwired.				✓			
Unit Ammeter (2)(3),(4)	-85AA	Analog ammeter and current transformer.			✓	✓			
	-85XA	Current transformer only for use with external meter. Current transformer rated 2.5VA or greater.			✓	✓			
Elapsed Time Meter (5), (6), (7)	-85T	Six digit non-resettable meter (with tenths), mounted in control station		✓		✓			
Unwired Timer Auxiliary (not available on 0.5 SF units)	-87A	Bulletin 596 time delay addition to NEMA size 1 through 5 contactors with N.O. and N.C. contacts. Not available with -7FEC_ E3.	On delay			✓			
	-87B		Off delay			✓			
Ground Detection Lights (8)	-88A	Three Bulletin 800T pilot lights (clear), wired in grounded WYE, complete with fusing	240 Volt	Available on Bulletin 2191M, 2192M and 2193M ONLY Not for use with solidly grounded power systems					SC
	-88B		480 Volt						
	-88C		600 Volt						
	-88H		208 Volt						
	-88I		415 Volt						
	-88KN		400 Volt						
	-88N		380 Volt						
	-88AT	Three Bulletin 800T push-to-test pilot lights (clear), wired in grounded WYE, complete with fusing	240 Volt	Available on Bulletin 2191M, 2192M and 2193M ONLY Not for use with solidly grounded power systems					
	-88BT		480 Volt						
	-88CT		600 Volt						
	-88HT		208 Volt						
	-88IT		415 Volt						
	-88KNT		400 Volt						
	-88NT		380 Volt						
Ground Fault Protection (9)	-88GF	Integral ground fault protection system with adjustable pick-up, adjustable time delay, control power indicator light, trip indicator and built-in test feature. Shunt trip is included. See required voltage code on 93.		Only available on Bulletin 2192M, 1600…2000 A. For use with solidly grounded WYE systems only.					PE-II

(1) Not available on dual starters, requires 1.5 space factor for size 1 and 2 and 2.0 space factor for 2113 size 3. Requires extra 0.5 space factor for NEMA Size 4 Bulletin 2112 with Class J and HRCII-C fuses. Requires 2.5 space factor for NEMA Size 4 Bulletin 2113 with MCP circuit breaker (Circuit Breaker code CA) and E1 Plus overload relay (Option 7FEE_). Not available in units containing a current transducer (700TC_). Available in Canada only. Available for 120V separate or transformer control only. Not available with E3 overload relay or E300 overload relay; for thermistor protection, use E3 Plus overload relay or E300 overload relay.

(2) 85XA, 85AA not available with 7FEE_D, 7FEC_, 7FE2, or 7FE3 .

(3) Ammeter has 5 A movement, 3.5" scale, 102° deflection and 2% of full scale accuracy. Current transformer for external meter is supplied with 8-foot secondary leads. Ammeter scale and CT ratio are determined by the horsepower code. Not valid on 0.5 space factor or dual mounted units, units with E3 overload relay (7FEC_), E300 overload relay (7FE2 or 7FE3), or units with E1 Plus overload relay with ground fault/jam protection (option 7FEE_G). Requires 2.5 space factor for NEMA Size 4 Bulletin 2113 with MCP circuit breaker (Circuit Breaker code CA) and E1 Plus overload relay (Option 7FEE_).

Footnotes continued on the next page.

(4) Unit ammeter and current transducer options are mutually exclusive.
(5) Elapsed time meter mounts in position normally used for a pilot device, limiting the maximum number of pilot devices selected. On 0.5 space factor units, elapsed time meter uses two positions normally used for a pilot device. Not available on dual mounted units. Available on units with 120V separate or transformer control only. Not available on 380…415V, 50 Hz applications.
(6) Mutually exclusive with control relay options 89CB, 89CBL, 89CF_ and 89P in 1.0 space factor and current transformer options 700TC1 and 700TC4 in 1.0 space factor. 1.0 space factor units are increased to 1.5 space factor.
(7) Requires option -90, Normal open auxiliary contact for Bulletin 2102L, 2103L, 2112 and 2113. Requires option -900011 for Bulletin 2112 and 2113 vacuum contactor starters.
(8) Not available on Bulletin 2191M units specified with metering options. Not available on Bulletin 2191MT, 600A in horizontal wireway, corner section or 10" wide incoming lug section. Not available on non-fused 2192M units. Mutually exclusive with key interlock mounting provision (option 201).
(9) Horizontal neutral bus and incoming neutral bus is required when 3-phase, 4-wire power system is specified. Available only on 480…600V, 60 Hz applications.
(10) Unit load ground connector and unit ground stab plating must match the horizontal and vertical ground bus plating.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 140 -

Option	Option Number	Description	Rating	Main Neutral Bus Location			Space Factor Adder			MLUG 2191 M (11)	MFDS 2192 M	MCB 2193 M	Delivery Program
				MLUG	MFDS	MCB	MLUG	MFDS	MCB				
Incoming Neutral Bus (1) For Bulletin 2191M (main lug) units. See table on page 84 for available lugs	-88HN_ (half-rated)	Provides for incoming neutral connection to horizontal neutral bus within the main incoming unit. Incoming neutral bus rating must match the horizontal neutral bus rating, half or full.	600	(5)			None			✓			PE
			800	(6)			None			✓			
			1200	(6)			None			✓			
			1600	(7)			None			✓			
			2000	(7)			None			✓			
	-88FN_ (full-rated)		600	(5)			None			✓			
			800	(6)			None			✓			
			1200	(6)			(6)			✓			
			1600	(7)			None			✓			
			2000	(7)			None			✓			
Incoming Neutral Bus (2) For Bulletins 2192M (main fusible disconnect switch) and 2193M (main circuit breaker). See tables on page 95 for 2192M and page 104 for 2193M standard and optional lugs.	-88HN (half-rated)	Provides for incoming neutral connection to horizontal neutral bus within the main incoming unit. Incoming neutral bus rating must match the horizontal neutral bus rating, half or full	400		(9)	(9)		(10)	None		✓	✓	
			600		(8)	(8)		1.0	1.0 (10)		✓	✓	
			800		(8)	(8)		1.0	1.0 (10)		✓	✓	
			1200		(8)	(8)		1.0	1.0		✓	✓	
			1600		(5)	N/A		None	N/A		✓	✓	
			2000		(5)	(5)		None	None		✓	✓	
	-88FN (full-rated)		150		N/A	(9)		N/A	None			✓	
			225		N/A	(9)		N/A	None			✓	
			400		(9)	(9)		(10)	None		✓	✓	
			600		(8)	(8)		1.0	1.0 (10)		✓	✓	
			800		(8)	(8)		1.0	1.0 (10)		✓	✓	
			1200		(8)	(8)		1.0	1.0		✓	✓	
			1600		(5)	N/A		None	N/A		✓	✓	
			2000		(5)	(5)		None	None		✓	✓	
			2500		(5)	(5)		None	None		✓	✓	
			3000		(5)	(5)		None	None		✓	✓	

Table is continued on the next page.

Table 140 -

Option	Option Number	Description	Rating	Main Neutral Bus Location			Space Factor Adder			MLUG 2191 M (11)	MFDS 2192 M	MCB 2193 M	Delivery Program
				MLUG	MFDS	MCB	MLUG	MFDS	MCB				
Incoming Neutral Connection Plate (3) (can be used only in sections with a vertical wireway)	-88NPC (4)	0.25″ x 2″ x 12″ copper tin plated bus plate with #6–250 kcmil lug. Insulated from and mounted on unit support pan. Located below main incoming unit if top entry and located above main incoming unit if bottom entry. Adds 0.5 space factor for main unit if less than 6.0 space factor. Not available for 2191M unit in top horizontal wireway. 280 A capacity.								✓(12)	✓(13)	✓(14)	SC-II
	-88NPS (4)	0.25″ x 2″ x 12″ copper silver plated bus plate with #6–250 kcmil lug. Insulated from and mounted on unit support pan. Located below main incoming unit if top entry and located above main incoming unit if bottom entry. Adds 0.5 space factor for main unit if less than 6.0 space factor. Not available for 2191M unit in top horizontal wireway. 280 A capacity.								✓(12)	✓(13)	✓(14)	PE

(1) Option code is not complete. Add location ('T' for the top, 'B' for the bottom) which matches the location of the horizontal neutral bus. Use 'T' for neutral bus above the main power bus. Use 'B' for neutral bus below the main power bus. **IMPORTANT:** For 800 A and 200 A which are not 6.0 space factor, the neutral bus code is opposite the incoming bus compartment mounting code.
(2) Available in U.S. In Canada, this option is engineered.
(3) Can only be used in sections with a vertical wireway. Cannot be used if horizontal neutral bus is selected. For applications with horizontal neutral bus, select the appropriate 88HN or 88FN option. If incoming neutral cable is greater than one, #6 AWG to 250 kcmil, or if neutral current exceeds 280 A, do not use option 88NPC or 88NPS. Select horizontal neutral bus and appropriate 88HN or 88FN options.
(4) Increases unit size by 0.5 SF, mounted below main unit that is top mounted or mounted above main unit that is bottom mounted. Main unit and neutral unit doors are interlocked
(5) Same as MLUG, MFDS, MCB (for example, if MLUG, MFDS, or MCB is in the top of the section, main neutral bus is in top bus pocket).
(6) Horizontal neutral must be located on the opposite side of the MLUG, except 6 space factor, the neutral bus location is unrestricted. 1200 A full-rated neutral must be 6 space factor.
(7) No restrictions.
(8) Horizontal neutral must be located below the main power bus.
(9) Top incoming only. Horizontal neutral must be located below the main power bus.
(10) Option 88HN/88FN changes unit to full-width of section, with no vertical wireway next to unit.
(11) Not available with 600 A incoming lug compartment in horizontal wireway, or 10″ wide section with incoming lugs.
(12) May only be selected for 300 A main incoming lug compartment. For ratings greater than 300 A, use incoming neutral bus option (-88HN_ or -88FN_).
(13) May only be selected for 400 A and smaller main fusible disconnect switch. For ratings greater than 400 A, use incoming neutral bus option (-88HN or -88FN).
(14) May only be selected for 400 A and smaller frame main circuit breaker. For frame ratings greater than 400 A, use incoming neutral bus option (-88HN or -88FN).

Table 141 -

Option	Option Number	Description	FVC	FVR	FVNR	TS1W TS2W	Delivery Program
			2102L 2103L	2106 2107	2112 2113	2122 2123	
Interposing Relay (1) (2) Mutually exclusive with 89CF and 89P, unwired control relays	-89CB	Control circuit interposing relay. Utilizes Bulletin 700-CF control relay to control starter coil in control circuit. Available on NEMA sizes 1…5 and vacuum contactor starters. The starter or contactor coil voltages and interposing relay coil voltages are the same as the control voltage.	✓		✓		SC (4)
				✓		✓	
	-89CBL (3)	Line circuit interposing relay. Utilizes Bulletin 700-CF control relay to control starter coil in control circuit. Available on NEMA sizes 1…5. The starter or contactor coil voltages are the same as the line voltage. The interposing relay coil voltage is the same as the control voltage.	✓		✓		
				✓		✓	

(1) 2.0 space factor minimum when selected on Bulletin 2113 size 3 starters and Bulletin 2106 and 2107 size 1 or 2. Not available on dual 2103L, dual 2113 units or 0.5 space factor units. Not available with common control. Mutually exclusive with 7FEC_ options, 7FE2 and 7FE3 options, 11DSA2 or 11DSA3 DeviceNet starter auxiliary options or 7FEE_D. When selected on 2122 or 2123 size 1 or 2 stater units, power terminal blocks are not provided; this requires the selection of option 106 (omit power terminal blocks).
(2) 2.5 space factor required when selecting Bulletin 2113B-E with E1+ Overload Relay
(3) Options 89CBL and 17 are mutually exclusive. When one control circuit fuse for separate control (21) is selected with 89CBL on 1.0 space factor Bulletin 2102L, 2103L, 2112 or 2113 units, one auxiliary contact mounting position (P3) is given up for the control circuit fuse.
(4) SC delivery for 110…120V control voltage. PE delivery for 220…240V control voltage.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 142 -

Option	Option Number	Description				FVC	FVR	FVNR	TS1W TS2W	Delivery Program
						2102L 2103L	2106 2107	2112 2113	2122 2123	
						QUANTITY SUPPLIED				
Unwired Control Relay (1) (2) Mutually exclusive with 89CB and 89CBL interposing relays For common control, 120V coil is provided	-89CF40	Bulletin 700CF 4-pole relay (3)		Instantaneous Contacts (Instantaneous contacts on Bulletin 700CF relays are non-convertible. Bulletin 700P relays have instantaneous contacts that are convertible from normally open to normally closed.)	4 N.O.	1	2	1	2	SC (5)
	-89CF31				3 N.O. and 1 N.C.					
	-89CF22				2 N.O. and 2 N.C.					
	-89CF40A	Bulletin 700CF 4-pole relay with time attachment 0.3…30 s (4)	**On-delay** includes one NOTC and one NCTO contact		4 N.O.	1	2	1	2	
	-89CF22A				2 N.O. and 2 N.C.					
	-89CF40B		**Off-delay** includes one NOTO and one NCTC contact		4 N.O.					
	-89CF22B				2 N.O. and 2 N.C.					
	-89CF40C	Bulletin 700CF 4-pole relay with time attachment 1.8 …180 s (4)	**On-delay** includes one NOTC and one NCTO contact		4 N.O.	1	2	1	2	
	-89CF22C				2 N.O. and 2 N.C.					
	-89CF40D		**Off-delay** includes one NOTO and one NCTC contact		4 N.O.					
	-89CF22D				2 N.O. and 2 N.C.					
	-89CF40L	Bulletin 700CF 4-pole relay with mechanical latch attachment (4)			4 N.O.	1	2	1	2	PE
	-89CF22L				2 N.O. and 2 N.C.					
	-89P2	Bulletin 700P relay			2 N.O.	1	2	1	2	SC (5)
	-89P4				4 N.O.					
	-89PT	Bulletin 700P with pneumatic time delay attachment (on/off delay) with two timed contacts (0.1…60 s) (4)			No instantaneous contacts	1	2	1	2	PE
	-89PT2				2 N.O.					
	-89PT4				4 N.O.					
	-89PL2	Bulletin 700P with mechanical latch attachment (4)			2 N.O.	1	2	1	2	

(1) Not available on dual 2103L units, dual 2113 units or 0.5 space factor units. When selected on 2122 or 2123 size 1 or 2 starter units, power terminal blocks are not provided; this requires the selection of option 106 (omit power terminal blocks). One relay is furnished per each contactor on reversing (2106/2107), 2-speed (2122/2123), and 2-speed reversing (2126/2127) starters. Bulletin 2106 and 2107 size 1 and 2 starters and Bulletin 2113 size 3 starters require 2.0 space factors when a relay is selected. Mutually exclusive with 11DSA2 and 11DSA3 DeviceNet starter auxiliary, 7FEC_ _ or 7FEE_D, 7FE2, or 7FE3.

(2) 2.5 space factor required when selecting Bulletin 2113B-E with E1+ Overload Relay

(3) When control circuit transformer is selected on Bulletin 2102L or 2103L 30 A or 60 A units or Bulletin 2112 or 2113 size 1 or 2 units, the secondary control transformer fuse is mounted in one of the three starter auxiliary contact pockets.

(4) When selected for 1 space factor Bulletin 2102L or 2103L 30 A or 60 A units or 1 space factor Bulletin 2112 or 2113 size 1 and 2 starters, the unit is increased to 1.5 space factor.

(5) SC delivery for 110…120V control voltage. PE delivery for 220…240V control voltage.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 143 - Externally Mounted Contactors

Option	Option Number	Description	NEMA Size	Wiring Type	Misc. Units		FVC (5)		FVR		FVNR (5)		TS1W TS2W		FDS		CB		Xfmr		Delivery Program
					2100D	2100M	2102L	2103L	2106	2107	2112	2113	2122	2123	2192F	2192M	2193F	2193M	2196	2197	
Auxiliary Contacts(1), (2)	-90	NORMALLY OPEN One N.O. auxiliary contact mounted on each contactor or starter	1…6	A			✓	✓			✓	✓									SC
									✓	✓			✓	✓							
				B (4)			✓	✓			✓	✓									
									✓	✓			✓	✓							
	-91	NORMALLY CLOSED One N.C. auxiliary contact mounted on each contactor or starter	1…6	A			✓	✓			✓	✓									
									✓	✓			✓	✓							
				B (4)			✓	✓			✓	✓									
									✓	✓			✓	✓							
	-98 (3)	NORMALLY OPEN One N.O. auxiliary contact (operates with movement of external handle only)	1…5	A or B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ (6)	✓	✓	✓	✓	
			6								✓	✓									
	-99 (3)	NORMALLY CLOSED One N.C. auxiliary contact (operates with movement of external handle only)	1…5	A or B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ (6)	✓	✓	✓	✓	
			6								✓	✓									

(1) Multiple auxiliary contacts of the same type must be grouped by repeating the second digit for each required contact of that type. For example, to get four of option -98 and two of option -99, the combined string would be **-98888-999**.

(2) All options use 120V AC rated accessories.

(3) The maximum number of auxiliary contacts that can be supplied is two, in any combination. Contacts actuate with movement of unit handle to ON or OFF position only. Contacts are not designed to actuate as the result of a circuit breaker trip. For such applications, auxiliary contacts -790K (G, H, and J) and -790A (all other frames)mounted internally must be selected. Auxiliary contacts are supplied unwired. Not available on dual 2192F units or 1600 A and 2000 A 2193M units.

(4) Type B auxiliary contacts are wired to terminal blocks. If the number of auxiliary contact wiring points required exceeds the number of terminals available in the unit, remaining auxiliary contacts are unwired. Refer to wiring diagram.

(5) For vacuum contactor starters only options codes **-91** or **-900-9111** are allowed.

(6) For 1600 A and 2000 A 2192M, the maximum number of auxiliary contacts is four. The following contact arrangements are allowed.
-98, -99, or -98-99 two contacts, (1) N.O/N.C. Form-C contacts
-988, -999 four contacts, two (1) N.O/N.C. Form-C contacts
The auxiliary contacts are mounted external to the switch and are actuated by the movement of the operating handle. Auxiliary contacts are supplied unwired.

Table 144 - Internally Mounted Contactors

Option	Option Number	Description	Breaker Frame	Wiring Type	Misc. Units		FVC (4)		FVR		FVNR (5)		TS1W TS2W		CB		Xfmr		Delivery Program
					2100D	2100M	2102L	2103L	2106	2107	2112	2113	2122	2123	2193F	2193M	2196	2197	
Auxiliary Contacts(1), (2)	-790K	One Form C Aux mounted internally in Circuit Breaker	G, H, J	A or B	✓	✓		✓		✓		✓				✓		✓	SC
	-790G(3)	Four Form C Aux mounted internally in Circuit Breaker	R	A or B											✓	✓			
	-790L	Two Form C Aux mounted internally in Circuit Breaker	G, H, J	A or B	✓	✓		✓		✓		✓				✓		✓	
	-790A	One Form C Aux, One Form C Alarm mounted internally in Circuit Breaker	G, H, J, K, M, N	A or B	✓	✓		✓		✓		✓				✓		✓	
	-790T	One Form C Alarm mounted internally in Circuit Breaker	G, H, J	A or B	✓	✓		✓		✓		✓				✓		✓	
	-790B	Two Form C Aux, One Form C Alarm mounted internally in Circuit Breaker	G, H, J	A or B	✓	✓		✓		✓		✓				✓		✓	

(1) Multiple auxiliary contacts of the same type must be grouped by repeating the second digit for each required contact of that type. For example, to get four of option -98 and two of option -99, the combined string would be **-98888-999.**

(2) All options use 120V AC rated accessories.

(3) Only available with R-Frame breakers.

(4) For vacuum contactor starters only options codes **-91** or **-900-9111** are allowed..

Table 145 - Maximum Number of Additional Auxiliary Contacts Per Starter/Contactor

Bulletin Number (1)	NEMA		
	Size 1-2	Size 3-5	Size 6
2102L, 2103L (2)(3)	6	5	—
2112/2113 (3)			4
2103L/2113 Dual		—	—
2106/2107	4	4	—
2122/2123			
2102L/2103L/2112/2113 0.5SF	3	—	—
2126/2127	4	—	—

(1) Units selected with OFF pilot light use one of these contacts. Bulletins 2126 and 2127 use two of these contacts.

(2) Size 1 and 2 with E3 or E300 overload relays are limited to 5 contacts.

(3) When Bulletin 596 timers are selected on 30…300 A contactors or size 1…5 starters, auxiliary mounting positions (P3 and P4) are used, limiting the maximum number of starter auxiliaries to two. When 89CB, 89CBL, 89CF, 89P, 700TC_, 11DSA2 or 11DSA3 with NEMA Type B wiring is present with transformer control in 1.0 space factor units, the number of starter auxiliary contacts is limited to four. When 89CBL is present with separate control and control circuit fuse (21) in 1.0 space factor units, the number of starter auxiliary contacts is limited to four (4) for units with 7FEC_ _. In E3 overloads, the number of starter auxiliary contacts is limited to five. For size 2 units with 7FEEE_ or 7FEE_D, E1 Plus Overload, the number of auxiliary contacts is limited to five. In E300 overloads, the nember of starter auxiliary contacts is limited to five.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 146 -

Option	Option Number	Description		FVC	FVR	FVNR	TS1W TS2W	2100-ESW	Delivery Program
				2102L 2103L	2106 2107	2112 2113	2122 2123		
Omission of Power Terminal Blocks (1)	-106	For contactors and starters (NEMA Type BD)	NEMA sizes 1, 2 and 3	✓	✓	✓			SC
							✓		
	-110 (6)	For 30 A and 60 A fusible disconnect feeders		Available for Bulletin 2192F ONLY					
Control Terminal Block (1),(2),(3), (4)	-107	One extra 5-pole control terminal block (unwired)		✓	✓	✓	✓		
T-Handle	-111	T-handle latch on unit door		Available on all units except 2191F, 2191M, 2192M, 2193M, 2195, 2193LE, 2193PP(11), and 2100-ESW(12), (13)					
Locking Latch	-114	Provision for accepting a lock on the door latch for the Ethernet Switch Unit. (1.0 SF Only)						✓ (12) (13)	PE
Key-interlock Mounting Provision (5)	-201	For circuit breaker or fusible disconnect main or feeder units. Permits customer mounting of Superior or Kirk brand key interlocks on unit operating handle. (8)		Available for Bulletins 2192 and 2193 ONLY					SC
Window	-203W(12)	Door mounted window on an Ethernet Switch Unit to provide visibility to the status LEDs on the Ethernet Switch(es) in the unit.						✓	
Current Transducers (4…20mA Output)	-700TC1 (7)	Ohio Semitronics Model MCT5-005E 85…135V AC, 50/60Hz power (includes current transformer)				✓			
	-700TC2 (7)	Crompton Instruments Model 253-TALU-LSHG 120V AC +/-20%, 50/60Hz power (includes current transformer).				✓			PE
Current Sensors (4…20mA Output)	-700TC4 (7)	N-K Technologies model AT 12…40V DC at sensor (current transformer not needed on sizes 1…3, included on sizes 4…6)				✓			SC
	-700TC5 (7)	Katy Instruments, 5…40V DC at sensor (current transformer not needed) model 420, sizes 1…3, all voltages				✓			
		Katy Instruments, 5…40V DC at sensor (current transformer not needed)(9)				✓			
		Katy Instruments, 5…40V DC at sensor (current transformer not needed)(10)				✓			

(1) Available for NEMA Wiring Type B only. Not available on 0.5 space factor units. Not available on Bulletin 2112 or 2113 size 2 in 1.0 space factor with E3 (option 7FEC_).

(2) A maximum of two 5-pole control terminal blocks only for each side of dual unit.

(3) An additional block of five control terminals can be supplied for customer use, provided the total number of control terminals does not exceed 15 maximum on units with power terminals, 20 maximum on units without power terminals. Check wiring diagram for limitations.

(4) Clarification for 2122/2123 units. NEMA size 1 or 2 requires the addition of -106 to accept -107. NEMA size 3 does not require -106 due to side mounted Power TB's.

(5) Mutually exclusive with ground detection lights (option 88_). Not available on 0.5 space factor units.

(6) This option is not available on dual mounted 2192F.

(7) Transducer/sensor output is unwired. Not available on 0.5 space factor or dual starter units. Not available with E1 Plus O.L. with ground fault/jam protection (option 7FEE_G). Options 700TC1, 700TC4 and 700TC5 require minimum 1.5 space factors for size 1 and 2 if optional control relay, timer auxiliary relay or 11DSA2/11DSA3 is used. Option 700TC1 requires minimum 2.0 space factors for Bulletin 2113, size 3 when 11DSA2 or 11DSA3 is used. When control circuit transformer primary fusing is selected, the control transformer secondary fuse is mounted in one of the three starter auxiliary contact pockets. Option 700TC2 always requires minimum 1.5 space factors for sizes 1 and 2. Option 700TC2 requires minimum 2.0 space factors for Bulletin 2113, size 3. Unit ammeter options, current transducer and thermistor protection relay options are mutually exclusive. Options 700TC1, 700TC2, 700TC4 and 700TC5 require extra 0.5 space factor for NEMA Size 4 Bulletin 2112 with Class J and HRCII-C fuses. Requires 2.5 space factor for NEMA Size 4 Bulletin 2113 with HMCP circuit breaker (circuit breaker code CA) and E1 Plus overload relay (Option 7FEE_). Option 700TC5 requires extra 0.5 space factor for NEMA Size 5 Bulletin 2112 with Class J fuses.

(8) For 150…1200 A 2192M and 150…1200 A 2193M units, use Superior key interlock #S105810Y, Type B-4003-1 (bolt flush when withdrawn) or Kirk key interlock #KFL000010. For 1600 A and 2000 A 2192M units, use Superior key interlock #S105821Y, Type B-06003-1 (bolt extends 0.375″ when withdrawn) or Kirk key interlock #KBL003710. **IMPORTANT: Fusible units should not be used on a tie (double ended) system, due to access to fuses and back feeding.** For these applications, contact your local Allen-Bradley distributor or Rockwell Automation sales representative. Not available on R-frame circuit breakers (option -TRUG).

(9) Model 420L, size 4 (all voltages) and size 5 at 380V, 415V, 480V, and 600V only.

(10) Model 420X, size 5 at 208V and 240V and size 6 (all voltages).

(11) Provided as standard with Bulletin 2193LE and 2193PP.

(12) Only available with unit-mounted industrial Ethernet switches.

(13) Locking Latch (-114) and T-Handles (-111) are mutually exclusive.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 147 -

Option	Option Number	Description		FVC	FVR	FVNR	TS1W TS2W	2100-ESW	Frame	Delivery Program
				2102L 2103L	2106 2107	2112 2113	2122 2123			
Control Circuit Wiring [1]	—	Type MTW(TEW) 90°C copper wire, VW1 rated	#16 AWG	✓	✓	✓	✓			SC
	-750 [5]	Type MTW(TEW) 90°C copper wire, VW1 rated	#14 AWG (tinned)	✓	✓	✓	✓			
	-750S [5]	Type SIS 90°C copper wire	#14 AWG (tinned)	✓	✓	✓	✓			SC (+2 days)
Control Circuit Lugs [1],[5],[2]	-750RL	Insulated ring lugs for control wires where possible		✓	✓	✓	✓			
	-750SL	Insulated spade lugs for control wires where possible		✓	✓	✓	✓			
Control Wire Markers [1]	-751D	Adhesive Brady Datab type markers at each end of control wire. Not available in Canada.		✓	✓	✓	✓	✓		SC
	-751HS	Heat shrink type wire marker		✓	✓	✓	✓	✓		SC (+2 days)
	-751S	Sleeve type wire marker		✓	✓	✓	✓	✓		SC
Omission of Circuit Breaker	-752	For combination starter units, MCP frame only. N/A in 0.5 space factor units.	NEMA size 1 and 2		✓	✓	✓			SC
			NEMA size 3		✓	✓	✓			
			NEMA size 4		✓	✓	✓			
Shunt Trip [3]	-754	Shunt Trip Relay. Applying potential to the relay trips the breaker. (120V)		Available on all circuit breaker units [6]						
100% Rating of Main Disconnect Switch or Circuit Breaker	-755	Provides 100% rating of main switch or circuit breaker. NEMA Type 1 and Type 1 with gasket only, except non-fused 2192M is available in NEMA Type 12. Not available with NEMA Type 3R or Type 4.		Available on 2192M, 600…2000 A [7]						PE-II
				Available on 2193M, 1200…3000 A Only					1200 A	SC
									2000 A	
									2500 A	
									3000 A [8]	
Undervoltage Release [3],[4]	-780	Undervoltage relay. Loss of potential to the relay trips the breaker. (120V)		✓	✓	✓	✓			

(1) Options for factory wiring of control circuits. Also available for 2100-DPS_, 2100-C2D, 2100-E2D_, and 2100-DC_05XWD units. Also 2192F, 2192M, 2193F, and 2193M units when option -11DSA_ is selected. 750B only available when unit is fed from the vertical or horizontal power bus. Dedicated auxiliary devices (for example, fans), device and component internal wiring and wiring that could affect operation or certifications (for example, insulation temperature class, EMC shielding requirements, communication requirements, UL, C-UL, CSA, CE) are not included.

(2) Examples where insulated lugs CANNOT be used: Bulletin 800F pilot devices, 700CF, size 6 auxiliaries, and disconnect/circuit breaker auxiliaries and where more than one wire per terminal is required.

(3) Shunt trip (-754) and Undervoltage Release (-780) are mutually exclusive.

(4) Only applies to the circuit breaker units.

(5) Not available on 0.5 space factor Bulletin 2102L, 2103L, 2112, or 2113 units.

(6) Not available on 2193PP plug-in panel board with main circuit breaker or 2193LE lighting panels or 2100M- empty units with circuit breaker.

(7) 600 A switch must use 601A, Class L fuse for 100% rating.

(8) Requires Over Temp Alarm pilot light (-4LH_) Shunt Trip (-754), or Undervoltage Release (-780), and separate control (-21) or transformer control (-6P_). Undervoltage Release requires separate control. Shunt trip requires transformer control.

Table 148 -

Option	Option Number	Description		FVC	FVR	FVNR	TS1W TS2W	2100 -ESW	Delivery Program
				2102L 2103L	2106 2107	2112 2113	2122 2123		
External Network Connector with 120V AC Receptacle	-767A[2]	Door mounted external DeviceNet connection and 120V AC receptacle for connection of computer to DeviceNet without having to open doors. Mounted on door of DeviceNet power supply unit. See Table 105.		Available on 2100-DPS_ units only. See Table 105 for unit selection.					SC
	-768A[2]	Door mounted external Ethernet connection and 120V AC receptacle for connection of computer to Ethernet network without having to open doors. Mounted on door of Ethernet power supply unit. See Table 105.		Available on 2100-EPS_ units only. See Table 105 for unit selection.				✓	
	-768B[3]	Door mounted external Ethernet connection for connection of computer to the embedded EtherNet/IP network without having to open doors. Mounted on the door of industrial Ethernet switch units. (Does not include 120V AC Receptacle.)		Available on 2100-EPS_ units only. See Table 105 for unit selection.				✓	
Network Power Supply, Redundant Design	-767C	Provides second power supply and anti-backfeed, blocking diodes. Allows seemless transfer of power from primary to secondary power supply in the event of an internal failure of the primary power supply.		Available only for 2100-DPS8_ units. See Table 105 for unit selection.					
	-768C	Provides second power supply and anti-backfeed, blocking diodes. Allows seemless transfer of power from primary to secondary power supply in the event of an internal failure of the primary power supply.		Available only for 2100-EPS8_ units. See Table 105 for unit selection.					
		Provides a second set of terminal blocks for a second power supply connection to the switches. This secondary connection is intended to be customer supplied. (Typically external to the MCC.)						✓[5]	
I/O Block	-768D[4]	Switch I/O and status contacts wired to control terminal blocks. Enables #22 to #12 guage I/O wire for these connections.						✓	
Industrial SD Card	-768E[5]	Includes 1GB Industrial SD Card. (Includes 1784-SD1)						✓	PE
Unwired Pull-apart Terminal Blocks	-800	Bulletin 1492-EC 5-pole terminal blocks	All mounting tabs on unit bottom plate are turned up for field installed terminal blocks	Available on 2100-NK and 2100-NJ empty unit inserts and 2100D and 2100M empty unit inserts with disconnecting means ONLY Not available on 2100-NK05 or 2100-NJ05 units.					SC
	-801		All mounting tabs on unit bottom plate are turned up. One 5-pole pull-apart terminal block included.						
	-802		All mounting tabs on unit bottom plate are turned up. Two 5-pole pull-apart terminal blocks included.						
	-803		All mounting tabs on unit bottom plate are turned up. Three 5-pole pull-apart terminal blocks included.						
	-804		All mounting tabs on unit bottom plate are turned up. Four 5-pole pull-apart terminal blocks included.						
French Legend Plates	-860F	Legend plates printed in French are available on all pilot devices. Specify 860F when pilot device option is selected.		Available on all pilot devices					
Spanish Legend Plates	-860S	Legend plates printed in Spanish are available on all pilot devices. Specify 860S when pilot device option is selected.		Available on all pilot devices					

Table is continued on the next page.

Table 148 -

Option	Option Number	Description		FVC	FVR	FVNR	TS1W TS2W	2100 -ESW	Delivery Program
				2102L 2103L	2106 2107	2112 2113	2122 2123		
Unit Door Nameplates (1)	—	Door Nameplate Screws	Plated steel nameplate screws. Provided when cardholder or nameplates are not selected.	Available on all units					SC
		Card Holder for Unit Doors	1.125" x 3.625" plastic card holders with blank cards	Available on all units					SC-II
		1.125″ x 3.625″ engraved 3-line or 4-line nameplate	Acrylic plate (available in U.S. only). Lettering is white with black letters or black with white letters.	Available on all units					
			Phenolic plate. Lettering is white with black letters, black with white letters or red with white letters.	Available on all units					
Overload Relay Heater Elements (Bulletin 592)	—	Set of three W-type heater elements per overload supplied loose in each unit. Available on SC-II or PE-II assembled motor control centers only. See page 343 for heater element selection instructions.			✓	✓			SC-II
							✓		
Stainless Steel Nameplate Screws	—	Stainless steel nameplate screws for unit nameplates (2 per unit)		Available on all units					
Export Packing Below Deck	—	Container is skid mounted and packaged in clear plastic. Packing is not watertight or waterproof. Considerations should be taken if extended storage is expected.		✓	✓	✓	✓		SC (+2 days)

(1) Blank nameplates are supplied when no engraving is selected. Letter height for 3-line nameplates is 0.22″. Letter height for 4-line nameplates is 0.18″. All text is centered horizontally and vertically.
(2) When specified on a Power Supply Unit with DeviceNet or EtherNet/IP network, the control circuit transformer increases to 500VA.
(3) Only available with non-wireway industrial Ethernet switch units.
(4) Available with wireway unit in CR2.
(5) Available in CR2.

Chapter 12

Factory-Installed Options, Modifications, Accessories for Space Saving NEMA Starter Units

- Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.
- Pilot devices are Bulletin 800F.
- To select pilot light lens color, add letter(s) to the option number:
  A = amber, B = blue, C = clear, G = green, R = red, W = white (for example, 4RG is a red ON and green OFF pilot light).
  Clear is not available on Bulletin 800F LED pilot lights. White is not available on Bulletin 800F incandescent pilot lights.

Table 149 - Pushbutton, Selector Switch, and Pilot Light Options

Option	Description		FVR	FVNR	Option Number	Delivery Program
			2106, 2107	2112, 2113		
Push Buttons (1), (2)	START-STOP			✓	-1(3)	SC
	FORWARD-REVERSE-STOP		✓			
	STOP		✓	✓	-1B(3)	
Push Buttons and Selector Switch (1), (2)	HAND-START, HAND-STOP, HAND-OFF-AUTO			✓	-1F(4)	
Selector Switch (1), (2)	HAND-OFF-AUTO			✓	-3	
	FORWARD-OFF-REVERSE (3)		✓			
	OFF-ON			✓	-3E(3)	
Pilot Lights (Full-voltage 800F) (2)	Standard Type Lens color designator A, B, C, G, R	ON		✓	-4_(4), (5)	
		ON-OFF		✓	-4__(4), (6), (7)	
		FORWARD-REVERSE	✓		-4__(7)	
		FORWARD-REVERSE-OFF	✓		-4___(6), (8)	
		OVERLOAD	✓	✓	-4T_(9)	
	LED Type Lens color designator A, B, G, R, W	ON		✓	-4L_(4), (5)	
		ON-OFF		✓	-4L__(4), (6), (7)	
		FORWARD-REVERSE	✓		-4L__(7)	
		FORWARD-REVERSE-OFF	✓		-4L___(6), (8)	
		OVERLOAD	✓	✓	-4TL_(9)	
	Push-to-Test Standard Type Lens color designator A, B, C, G, R	ON		✓	-5_(4), (5)	SC
		ON-OFF		✓	-5__(4), (6), (7)	
		FORWARD-REVERSE	✓		-5__(7)	
		FORWARD-REVERSE-OFF	✓		-5___(6), (8)	
		OVERLOAD	✓	✓	-5T_(9)	
	Push-to-Test LED Type Lens color designator A, B, G, R, W	ON		✓	-5L_(4), (5)	
		ON-OFF		✓	-5L__(4), (6), (7)	
		FORWARD-REVERSE	✓		-5L__(7)	
		FORWARD-REVERSE-OFF	✓		-5L___(6), (8)	
		OVERLOAD	✓	✓	-5TL_(9)	

(1) Push buttons cannot be used in conjunction with selector switches, except with option 1F.

(2) Maximum of four pilot devices on 0.5 space factor units. When more than four pilot devices are required, the 0.5 space factor units is increased to 1.0 space factor. Maximum of six pilot devices on 1.0 space factor and larger units.

(3) Mutually exclusive with DeviceNet Starter Auxiliary (11DSA_), E3 solid-state overload relays (7FEC_ _), E1 Plus solid state overload relay 7FEE_D, and EtherNet/IP Communication Module (ENET).

(4) When option 1F is used with 11DSA_ , 7FEE_D, or ENET, one N.O. auxiliary contact, option 90, is required. When option 1F is selected with any ON pilot light, one N.O. auxiliary contact, option 90, is required.

(5) When used in 2112 or 2113 with DeviceNet Starter Auxiliary (11DSA_), 7FEE_D, E3 electronic overload relay (7FEC_ _), or -ENET, one N.O. auxiliary contact, option 90, is required.
When used in 2112 or 2113 with DeviceNet Starter Auxiliary (11DSA3) and option 1F, 7FEE_D and option 1F, E3 electronic overload relay (7FEC_ _) and option 1F, or -ENET and option 1F, two N.O. auxiliary contacts, option 900, are required.

(6) Select one N.C. auxiliary contact, option 91, for OFF pilot light when in 2106, 2107, 2112 or 2113.

(7) When used in 2112 or 2113 with DeviceNet Starter Auxiliary (11DSA3), 7FEE_D, E3 electronic overload relay (7FEC_ _), or -ENET, one N.O. and one N.C. auxiliary contact, option 901, is required.
When used in 2112 or 2113 with DeviceNet Starter Auxiliary (11DSA3) and option 1F, 7FEE_D and option 1F, E3 solid-state overload relay (7FEC_ _) and option 1F, or -ENET and option 1F, two N.O. and one N.C. auxiliary contacts, option 9001, are required.
When used in 2106 or 2107 with DeviceNet Starter Auxiliary (11DSA3) or E3 electronic overload relay (7FEC_ _), one N.O. auxiliary contact, option 90, is required.

(8) When used in 2106 or 2107 with DeviceNet Starter Auxiliary (11DSA3) or E3 electronic overload relay (7FEC_ _), one N.O. and one N.C. auxiliary contact, option 901, is required.

(9) Not available with DeviceNet Starter Auxiliary (11DSA3), 7FEE_D, E3 electronic overload relay (7FEC_ _), or -ENET.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 150 - Control Circuit Transformers, OL Relays, and DSA Options

Option	Option Number	Description		FVR	FVNR	Delivery Program
				2106, 2107	2112, 2113	
Control Circuit Transformer (with grounded and fused secondary)	-6P	Standard capacity with primary fusing	NEMA Size 1	80VA[11]	80VA[11]	SC
			NEMA Size 2	80VA	80VA[11]	
			NEMA Size 3	130VA	130VA	
			NEMA Size 4	250VA	250VA	
	-6XP [9]	Extra capacity with primary fusing	NEMA Size 1	130VA	130VA	
			NEMA Size 2	130VA	130VA	
			NEMA Size 3	200VA	200VA	
			NEMA Size 4	350VA	350VA	
E1 Plus Electronic Overload Relay [1],[2]	-7FEE_ [10]	Selectable trip class (10, 15, 20, 30) selectable Auto/Manual-Auto reset electronic overload relay for NEMA starters, size 1…4.		✓	✓	
E1 Plus Electronic Overload Relay with DeviceNet Module [1],[2],[4]	-7FEE_D[10]	Selectable trip class (10, 20, 30). Selectable Auto/Manual-Auto reset electronic overload relay for starters Size 1…4. Includes DeviceNet module with two 24V DC inputs and one 110…120V AC output.			✓	
E1 Plus Electronic Overload Relay with Ground Fault Protection Module & Jam Protection [1],[2]	-7FEE_G[10]	Selectable to class (10, 15, 20, 30) selectable Auto/Manual-Auto reset electronic overload relay for NEMA starters, size 1…3. Includes Ground Fault Protection Module with integral Jam Protection and external Ground Fault Sensor.	NEMA Size 1, 2	✓	✓	
			NEMA Size 3	✓	✓	
			NEMA Size 4		✓[12]	
E1 Plus Electronic Overload Relay with Jam Protection Module [1],[2]	7FEE_J[10]	Selectable trip class (10, 15, 20, 30) selectable Auto/Manual-Auto reset electronic overload relay for NEMA starters, size 1…4 with Jam Protection Module		✓	✓	
E3 Electronic Overload Relay [2],[3],[4] IMPORTANT: For non-DeviceNet applications, a 24V DC separate power source is needed. A Bulletin 193-DNCT DeviceNet Configuration Terminal is needed for programming and monitoring.	-7FEC1_ [10]	E3 Basic overload relay is provided with two 24V DC inputs and one 110…240V AC output	Size 1		✓	
			Size 2		✓	
			Size 3		✓	
			Size 4		✓[6]	
	-7FEC2_ [10]	E3 Plus overload relay is provided with four 24V DC inputs and two 110…240V AC outputs	Size 1	✓	✓	
			Size 2	✓	✓	
			Size 3	✓	✓	
	-7FEC3_ [10]		Size 4		✓[6]	

Table is continued on the next page.

Table 150 - Control Circuit Transformers, OL Relays, and DSA Options

Option	Option Number	Description		FVR	FVNR	Delivery Program
				2106, 2107	2112, 2113	
DeviceNet Starter Auxiliary (DSA) [4],[5],[6] (mutually exclusive)	-11DSA2	For use with starters to provide DeviceNet inputs and outputs. Four 120V AC inputs and two 120V outputs. Cannot be selected with E3 electronic overload relay (7FEC_ _) or E1 Plus with DeviceNet (7FEE_D).		✓	✓	SC
	-11DSA3	For use with starters to provide DeviceNet inputs and outputs. Four 24V DC inputs and two 240V AC max outputs. Cannot be selected with E3 electronic overload relay (7FEC_ _) or E1 Plus with DeviceNet (7FEE_D).		✓	✓	
Overload EtherNet/IP Communication Module [7] [8]	-ENET	For use on staraters to provide EtherNet/IP communication for the Electronic Overload Relay.	E1 Plus		✓	

(1) E1 Plus electronic overload relay is supplied with one N.O. and one N.C. auxiliary contact.
(2) Overload relay option 7FEE_, 7FEE_D, 7FEE_G, 7FEE_J or 7FEC_ _ _ must be specified.
Overload relay option 7FEE_, 7FEE_D, 7FEE_G, 7FEE_J and 7FEC_ _ are mutually exclusive.
(3) 0.5 space factor Size 1, Bulletin 2106 and 2107 units are increased to 1.0 space factor.
0.5 space factor Size 1, Bulletin 2112 and 2113 units with pilot devices and external reset button for overload relay are increased to 1.0 space factor.
0.5 space factor Size 2, Bulletin 2113 units are increased to 1.0 space factor.
(4) Not available with push button or selector switches, except options 3 and 1F. Not available with unwired control relay, option 89CF_ and 89HA_.
(5) 0.5 space factor Size 1, Bulletin 2107 units are increased to 1.0 space factor.
(6) 1.0 space factor Size 4, Bulletin 2113 units are increased to 1.5 space factor.
(7) Not available with E3 Electronic Overload, option -7FEC_ _.
(8) Mutually exclusive with E1 Plus options -7FEE_D, -7FEE_G, and -7FEE_J.
(9) Extra capacity control circuit transformer, option 6XP, changes 0.5 space factor units to 1.0 space factor.
(10) Option number is not complete.
- Select overload relay code from appropriate table below and add to option number (for example, 7FEE**D** or 7FEC2**B**).
- For option 7FEC_ _, review configuration options in the table below, and, if needed, select, and add to option number (for example, 7FEC1B**Y** or 7FEC3F**YG**).
- NEMA size 1…3 E3 Plus overload relays have ground fault sensor as standard. NEMA size 4…6 E3 Plus overload relays need to have the ground fault configured to include a ground fault sensor. Refer to Table 153 for E3 overload relay configuration options.

(11) For 0.5 space factor or 1.0 space factor with option -15; Bulletin 2106, 2107, 2112 and 2113, the standard capacity VA rating is 75VA.
(12) Bulletin 2113, NEMA Size 4 with circuit breaker suffix CA are increased to 1.5 space factors. Bulletin 2113, NEMA Size 4 with circuit breaker suffix CT or CM are increased to 2.0 space factors.

Table 151 - Overload Relay Codes for E1 Plus, Option 7FEE

For use with Space Saving NEMA Size	Full Load Current Range (Amperes)	Overload Relay Code, Add to Option Number (for example, 7FEED)
1	1…5	C
	3.2…16	D
	5.4…27	E
2	9…45	F
3	18…90	G
4	30…150	H

Table 152 - Overload Relay Codes for E3 and E3 Plus, Option -7FEC_

For use with Space Saving NEMA Size	Full Load Current Range (Amperes)	Overload Relay Code, Add to Option Number (for example, 7FEC2B)
1	1…5	A
	3…15	B
	5…25	C
2	9…45	D
3	18…90	E
4	28…140	F

Table 153 - E3 Overload Relay Configuration Options

Description	Overload Relay Code (Add to option number [for example 7FEC3FYG])
24V DC input points	None
120V AC input points, available for 110…120V AC control voltage only	Y
Ground fault. Includes Bulletin 193-CBCT3 ground fault sensor	G(1)
120V AC input points and ground fault (see description above)	YG(1)

(1) Available for Size 4 E3 Plus overload relays only. 1.5 space factor Size 4, Bulletin 2113 units with circuit breaker suffix TGM , are increased to 2.0 space factor.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order**.**

Table 154 - Space, Surge Suppression, Grounding, and Relay Options

Option	Option Number	Description				FVR 2106, 2107	FVNR 2112, 2113	Delivery Program
Additional Unit Space	-15	Adds 0.5 space factor to the unit after any required space factor increases (due to other options) have been added.				✓	✓	SC
Surge Suppressor	-17	On starter coil, one per contactor. Selection of this option requires the selection of Option -17R if an optional relay (89___) is also selected.					✓	
						✓		
	-17R	On control relay, one per control relay. Can only be used if optional relay (89___) is selected. Selection of this option requires selection of Option -17.					✓	
						✓		
Omit Wiring	-19	Omission of control wiring, except primary and secondary transformer wiring				✓	✓	
Control Circuit Fuse	-21	One control circuit fuse for separate control				✓	✓	
Grounded Unit Door	-79GD	Hinge mounted ground strap mounted on bottom hinge of unit door				✓	✓	
Unit Load Connector	-79L	Select on all plug-in units in section with vertical unit load ground bus			Unplated Copper	✓	✓	
	-79LT[6]				Tin Plated Copper	✓	✓	
Unit Ground Stab	—	Copper unit grounds stabs can be used with steel vertical ground bus. Select on plug-in units in sections with vertical plug-in ground bus			Copper Alloy	✓	✓	
	-79U				Unplated Copper	✓	✓	
	-79UT[6]				Tin Plated Copper	✓	✓	
Elapsed Time Meter[1]	-85T	Six-digit non-resettable meter with tenths, mounted in control station					✓	
Unwired Control Relay[2],[3],[4],[5]	-89CF40	Bulletin 700CF 4-pole relay		Instantaneous Contacts	4 N.O.	2	1	
	-89CF31				3 N.O. / 1 N.C.	2	1	
	-89CF22				2 N.O. / 2 N.C.	2	1	
	-89CF40A[7]	Bulletin 700CF 4-pole relay with time attachment 0.3…30 s	On-delay with one NOTC and one NCTO contact		4 N.O.	2	1	
	-89CF22A[7]				2 N.O. / 2 N.C.	2	1	
	-89CF40B[7]		Off-delay with one NOTO and one NCTC contact		4 N.O.	2	1	
	-89CF22B[7]				2 N.O. / 2 N.C.	2	1	
	-89CF40C[7]	Bulletin 700CF 4-pole relay with time attachment 1.8…180 s	On-delay with one NOTC and one NOTO contact		4 N.O.	2	1	
	-89CF22C[7]				2 N.O. / 2 N.C.	2	1	
	-89CF40D[7]		Off-delay with one NCTO and one NCTC contact		4 N.O.	2	1	
	-89CF22D[7]				2 N.O. / 2 N.C.	2	1	
	-89CF40L[7]	Bulletin 700CF 4-pole relay with mechanical latch attachment			4 N.O.	2	1	
	-89CF22L[7]				2 N.O. / 2 N.C.	2	1	
	-89HA33[8]	Bulletin 700HA 3PDT relay (Contacts rated 240V AC, max.)			3 N.O. / 3 N.C.	2	1	

(1) Elapsed Time Meter (85T) requires one N.O. auxiliary contact, option 90. Mounts in position normally used for two pilot devices, limiting the maximum number of pilot devices allowed.
(2) Not available with E3 electronic overload relays (7FEC) or E1 Plus electronic overload relay with DeviceNet Communications (7FEE_D).
(3) Requires Size 3 Bulletin 2113 unit to be 1.5 space factor when specified with control circuit transformer (Option 6P or 6XP).
(4) Requires Size 4 Bulletin 2113 unit to be 1.5 space factor when specified with E1 Plus overload relay (Option 7FEE_), and control circuit transformer (Option 6P or 6XP).
(5) 2.5 space factor required when selecting Bulletin 2113B-E with E1+ Overload Relay.
(6) Unit load ground connector and unit ground stab plating must match the horizontal and vertical ground bus plating.
(7) Requires Size 2 Bulletin 2107 unit to be 1.5 space factor when specified with control circuit transformer (Option 6P or 6XP).
(8) Size2 Bulletin 2113 units will be increased to 1.0 space factor.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 155 - Contact, T-Handle, Wire Marker, and Legend Options

Option	Option Number	Description		FVR	FVNR	Delivery Program
				2106, 2107	2112, 2113	
Auxiliary Contacts (1)	-90(3)	NORMALLY OPEN One N.O. auxiliary contact on each contactor or starter			✓	SC
				✓		
	-91 (3)	NORMALLY CLOSED One N.C. auxiliary contact on each contactor or starter			✓	
				✓		
	-98(4)	NORMALLY OPEN One N.O. auxiliary contact (operates with movement of external handle only)		✓	✓	
	-99(4)	NORMALLY CLOSED, One N.C. auxiliary contact (operates with movement of external handle only)		✓	✓	
	-790K(5)	One Form C Aux mounted internally in Circuit Breaker		✓	✓	
	-790L(5)	Two Form C Aux mounted internally in Circuit Breaker		✓	✓	
	-790A(5)	One Form C Aux, One Form C Alarm mounted internally in Circuit Breaker		✓	✓	
	-790T(5)	One Form C Alarm mounted internally in Circuit Breaker		✓	✓	
	-790B(5)	Two Form C Aux, One Form C Alarm mounted internally in Circuit Breaker		✓	✓	
T-Handles	-111	T-handle latch on unit door		✓	✓	
Control Wire Markers	-751D	Adhesive Brady Datab type markers at each end of control wire. Not available in Canada		✓	✓	
	-751HS	Heat shrink type wire marker		✓	✓	
	-751S	Sleeve type wire marker		✓	✓	
French Legend Plates	-860F	Legend plates printed in French are available on all pilot devices. Specify 860F when pilot device option is selected.		✓	✓	
Spanish Legend Plates	-860S	Legend plates printed in Spanish are available on all pilot devices. Specify 860S when pilot device option is selected.		✓	✓	
Unit Door Nameplate(2)	—	Door Nameplate Screws	Plated steel nameplate screws. Provided when cardholder or nameplates are not selected.	✓	✓	
		Card Holder for Unit Doors	1.125'' x 3.625'' plastic card holders with blank cards	✓	✓	SC-II
	—	1.125” x 3.625” engraved 3-line or 4-line nameplate	Acrylic plate (available in U.S. only), white with black letters or black with white letters	✓	✓	
	—		Phenolic plate, white with black letters, black with white letters or red with white letters	✓	✓	
Stainless Steel Nameplate Screws	—	Stainless steel nameplate screws for unit nameplates (two per unit)		✓	✓	SC
Export Packing Below Deck	—	Container is skid mounted and packaged in clear plastic. Packing is not watertight or waterproof. Considerations should be taken if extended storage is expected.		✓	✓	SC (+2 days)

(1) Multiple auxiliary contacts must be group coded by adding the second and third digit of the special feature number to the base digit ‘9’ (for example, 90-91-98-99, when group coded, reads 9018X9)

(2) Blank nameplates are supplied when no engraving is selected or provided. Letter height for 3-line nameplates is 0.22.” Letter height for 4-line nameplates is 0.18.” All text is centered horizontally and vertically.

(3) Auxiliary contacts are wired to terminal blocks. If the number of auxiliary contact wiring points exceeds the number of terminals available in the unit, remaining auxiliary contacts are unwired. See Table 156 for allowable auxiliary contact configurations.

(4) The maximum number of auxiliary contacts that can be supplied is two in any combination. Contacts actuate with movement of unit handle to ON or OFF position only. Contacts are not designed to actuate as the result of a circuit breaker trip. For such applications, auxiliary contacts -790K (G, H, and J) and -790A (all other frames) mounted internally must be selected.

(5) Only available for Bulletin 2107 and 2113.

Table 156 - Auxiliary Contact Options

Auxiliary Contact Catalog String	Bulletin 2106 and 2112 Sizes 1, 2, and 3	Bulletin 2113 Size 4
-90	✓	✓
-91	✓	✓
-900	✓	✓
-90-91	✓	✓
-911	✓	✓
-9000	✓	✓
-900-91	✓	✓
-90-911	✓	✓
-9111	✓	N/A
-90000	✓	✓
-9000-91	✓	✓
-900-911	✓	✓
-90-9111	✓	N/A
-91111	✓	N/A

Notes:

Chapter 13

Combination Soft Starter (SMC) Units

Bulletin 2154H and 2155H Soft Starter (SMC) Units - SMC-3

These combination soft starter units are designed especially for use in CENTERLINE motor control centers. Each unit contains a microprocessor-controlled motor controller, control circuit transformer, and either a fusible disconnect switch or circuit breaker.

Features include:

- Three starting modes: soft start, kick start, and current limit
- Electronic overload protection with selectable overload trip class
- Motor and system diagnostics
- Configurable auxiliary contacts
- Soft stop
- Integrated bypass contactor
- High Interrupting Capacity Fuses (Option -13HIC) included on all units

Each unit is provided as a NEMA Class 1, Type B unit with terminal blocks mounted within the controller unit for connection of items such as, remote pilot devices and input signals. Bulletins 2154H and 2155H are available in NEMA Type 1, NEMA Type 1 with gasket and NEMA Type 12 plug-in construction. Class J time delay fuses provide branch circuit protection on Bulletin 2154H units. Instantaneous or a variety of inverse time (thermal magnetic) circuit breakers provide branch circuit protection on 2155H units. A variety of options such as isolation contactors, auxiliary contacts, pilot devices, protective modules, and DeviceNet Starter Auxiliary (DSA), can be added to Bulletin 2154H and 2155H units. Extra space can be required to accommodate the optional equipment.

Catalog Number Explanation - Bulletin 2154H and 2155H Combination Soft Starter (SMC-3) Unit

- Bulletin 150 SMC-3 Solid State Controller
- Three starting modes: soft start, kick start, and current limit
- 3…135 A rating
- Built-in bypass contactor and overload relay
- NEMA Class I, Type B wiring with terminals mounted in the unit

Table 157 -

2154H	**B**	-	**A**	**A**	**B**	-	**38**	-	**
2155H	**B**	-	**A**	**A**	**B**	-	**38THM**	-	**
Bulletin Number	Wiring Type		Current Rating	NEMA Enclosure Type	Line Voltage		Horsepower/kW Code and Disconnecting Means		Options

Code	Type
2154H	SMC-3 Soft Starter (SMC) with Fusible Disconnect
2155H	SMC-3 Soft Starter (SMC) with Circuit Breaker

Code	Wiring Type
B	Type B

Code	NEMA Enclosure Type
A	NEMA Type 1 or Type 1 with gasket with external reset button
K	NEMA Type 1 or Type 1 with gasket without external reset button
D	NEMA Type 12 with external reset button
J	NEMA Type 12 without external reset button

Code	Options
See Options section beginning on page 191.	

Code	Horsepower/kW Code and Disconnecting Means
2154H- '38'	'38' Horsepower/kW code See tables on Page 314
2155H- '38THM'	'38___' Horsepower/kW code '___THM' Circuit Breaker Type See tables on page 314 and 321

Code	Current Rating
A	3 A
B	9 A
D	19 A
E	25 A
F	30 A
G	37 A
H	43 A
J	60 A
K	85 A
L	108 A
M	135 A

Code	Line Voltage
P	220…230V (1)
A	240V
N	380V (1)
KN	400V (1)
I	415V (1)
B	480V
C	600V

(1) Units at these voltages are not UL or C-UL listed.

Units—2154H Combination Soft Starter Motor Controller with Fusible Disconnect Switch (SMC-3)

- See page 179 for product description.
- Basic configuration includes power fuses.
- Isolation contactor (-13IC) is optional. Select on page 195. This addition or other options can require additional space, see Table 159, Table 160, and the footnotes in the Options section.
- Control circuit transformer included.
- Bulletin 150 SMC-3 controller includes one N.O. auxiliary contact set to NORMAL. The Bulletin 150-CF64 fan also is included for 3…37 A ratings. Integrated fan is standard for 43…135 A ratings.
- Bulletin 150 SMC-3 controllers are cULus (UL and C-UL listed) as motor overload protective devices. An external overload relay is not required for single motor applications.
- See page 357 for short circuit withstand ratings.

Table 158 - Bulletin 2154H Units

Rating (Amps)	Nominal Horsepower (Nominal kW) The horsepower and kW ratings shown are nominal. The limiting factor in the application and use of the SMC-3 is the output ampere rating.					Disc. Rating	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
	220…230V (1)	240V	380…415V (1)	480V	600V (2)		Space Factor(3)	Catalog Number (5) Wiring Type B— Class I	Space Factor(3)	Catalog Number (5) Wiring Type B— Class I	
3	(0.25…0.55)	0.5	(0.37…1.1)	0.5…1.5	0.75…2	30	0.5 (4)	2154HB-AA_-_	0.5 (4)	2154HB-AD_-_	SC
9	(0.75…2.2)	0.75 …2	(1.5…3.7)	2…5	3…7.5	30	0.5 (4)	2154HB-BA_-_	0.5 (4)	2154HB-BD_-_	
19	(3.7)	3…5	(5.5…7.5)	7.5…10	10…15	30	0.5 (4)	2154HB-DA_-_	0.5 (4)	2154HB-DD_-_	
25	(5.5)	7.5	(11)	15	20	30	1.0	2154HB-EA_-_	1.0	2154HB-ED_-_	
30	(7.5)	10	(15)	20	25	60	1.0	2154HB-FA_-_	1.0	2154HB-FD_-_	
37	—	—	(18.5)	25	30	60	1.0	2154HB-GA_-_	1.0	2154HB-GD_-_	
43	(11)	15	(22)	30	40	60	1.5	2154HB-HA_-_	2.0	2154HB-HD_-_	
60	(15)	20	(30)	40	50	100	1.5	2154HB-JA_-_	2.5	2154HB-JD_-_	
85	(18.5…22)	25… 30	(37)	50	—	100		2154HB-KA_-_		2154HB-KD_-_	
	—	—	(45)	60	60…75	200					
108	(30)	40	(55)	75	100	200	3.5	2154HB-LA_-_	4.0	2154HB-LD_-_	
135	(37)	50	—	100	125	200		2154HB-MA_-_		2154HB-MD_-_	

(1) Units at these voltages are not UL or C-UL listed.

(2) Delivery program is PE in U.S. and SC in Canada.

(3) See space factor tables below for NEMA Type 12 or for any NEMA Type when options are selected.

(4) These units have horizontal operating handles, Bulletin 194R fused molded case switch, up to four Bulletin 800F pilot devices and one 10 pt. pull-apart control terminal block (Type B-D only), with #16 AWG control wire only.

(5) The catalog numbers listed are not complete:

- Select the control voltage code from table on page 313 to identify the preferred control voltage (for example, 2154HB-AA**B**).
- If horsepower rated, select the number from table on page 314 that corresponds to the nominal horsepower desired (for example, 2154HB-AAB-**35**).
- If kW rated, select the number from table on page 315 that corresponds to the nominal kW desired (for example, 2154HB-AAN-35K).
- The catalog numbers listed include an external reset button for the SMC-3. To order catalog numbers without the external reset button, replace the letter 'A', in the second position, with the letter 'K' (for example, 2154HB-A**K** __-__) or replace the letter 'D' with the letter 'J' (for example, 2154HB-A**J**__-__).

Table 159 - Bulletin 2154H Space Factors with NEMA Type 1 Unit Options (refer to page 194…196)

Ratings (Amps)	NEMA Type 1 and 1 with Gasket					
	Standard Unit	With Option 13DSA_	With Option 13IC	With Option 89CF	With Option 13IC and 13DSA_	With Option 13IC and 89CF
3…19	0.5(1)	0.5(1)	0.5(1)	0.5(1),(3)	1.5	1.5
25…37	1.0	1.0	1.0	1.0		
43	1.5	1.5	1.5	1.5		
60					2.0	2.0
85		1.5 (2)	1.5(2)	1.5(2)		
108…135	3.5					

(1) 1.0 space factor when -750, -750B, or -750S is selected.
(2) 2.0 space factor for 45 kW at 380…415V, 60 HP at 480V and 60…75 HP at 600V applications.
(3) 1.0 space factor when -89CF_A, -89CF_B, -89CF_C, -89CF_D or -89CF_L specified.

Table 160 - Bulletin 2154H Space Factors with NEMA Type 12 Unit Options (refer to page 194…196)

Ratings (Amps)	NEMA Type 12					
	Standard Unit	With Option 13DSA_	With Option 13IC	With Option 89CF	With Option 13IC and 13DSA_	With Option 13IC and 89CF
3…19	0.5(1)	0.5(1)	0.5(1)	1.0	1.5	1.5
25…37	1.0	1.0				
43	2.0	2.0	2.0	2.0	2.0	2.0
60	2.5	2.5	2.5	2.5	2.5	2.5
85			3.0		3.0	3.0
108…135	4.0					

(1) 1.0 space factor when -750, -750B, or -750S is selected.

Units—2155H Combination Soft Starter Motor Controller with Circuit Breaker (SMC-3)

- See page 179 for product description.
- Isolation contactor (-13IC) is optional. Select on page 195. This addition or other options can require additional space, see Table 161, Table 162, and the footnotes in the Options section.
- Control circuit transformer included.
- Bulletin 150 SMC-3 controller includes one N.O. auxiliary contact set to NORMAL. The Bulletin 150-CF64 fan also is included for 3…37 A ratings. Integrated fan is standard for 43…135 A ratings.
- Bulletin 150 SMC-3 controllers are cULus (UL and C-UL listed) as motor overload protective devices. An external overload relay is not required for single motor applications.
- See page 357 for short circuit withstand ratings. Fusing is required.

Table 161 - Bulletin 2155H Units

Rating (Amps)	Nominal Horsepower (Nominal kW) The horsepower and kW ratings shown are nominal. The limiting factor in the application and use of the SMC-3 is the output ampere rating.					NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
	220…230V (1)	240V	380…415V (1)	480V	600V (2)	Space Factor(3)	Catalog Number (4) Wiring Type B - Class I	Space Factor(3)	Catalog Number(4) Wiring Type B - Class I	
3	(0.25…0.55)	0.5	(0.37…1.1)	0.5…1.5	0.75…2	1.0	2155HB-AA_-___	1.0	2155HB-AD_-___	SC
9	(0.75…2.2)	0.75…2	(1.5…3.7)	2…5	3…7.5		2155HB-BA_-___		2155HB-BD_-___	
19	(3.7)	3…5	(5.5…7.5)	7.5…10	10…15		2155HB-DA_-___		2155HB-DD_-___	
25	(5.5)	7.5	(11)	15	20		2155HB-EA_-___		2155HB-ED_-___	
30	(7.5)	10	(15)	20	25		2155HB-FA_-___		2155HB-FD_-___	
37	—	—	(18.5)	25	30		2155HB-GA_-___		2155HB-GD_-___	
43	(11)	15	(22)	30	40	1.5	2155HB-HA_-___	2.0	2155HB-HD_-___	
60	(15)	20	(30)	40	50		2155HB-JA_-___	2.5	2155HB-JD_-___	
85	(18.5…22)	25…30	(37)	50	—		2155HB-KA_-___	3.0(5)	2155HB-KD_-___	
	—	—	(45)	60	60…75					
108	(30)	40	(55)	75	100	2.5	2155HB-LA_-___	3.5	2155HB-LD_-___	
135	(37)	50	—	100	—	2.5	2155HB-MA_-___		2155HB-MD_-___	
135	—	—	—		125	3.0				

(1) Units at these voltages are not UL listed or CSA certified.
(2) Delivery program is PE in the United States and SC in Canada.
(3) See space factor tables below for options.
(4) The catalog numbers listed are not complete:
- Select the control voltage code from the table on page 314 to identify the preferred control voltage (for example, 2155HB-AA**B**)
- If horsepower rated, select the number from the table on page 314 that corresponds to the nominal horsepower desired (for example, 2155HB-AAB-**35**)
- If kW rated, select the number from the table on page 315 that corresponds to the nominal kW desired (for example, 2155HB-AAN-**35K**)
- Select the appropriate suffix from the table on page 321 to identify the circuit breaker type (for example, 2155HB-AAB-35**THM** or 2155HB-AAN-35K**THM**)
- The catalog numbers listed include an external reset button for the SMC-3. To order catalog numbers without the external reset button, replace the letter 'A' with the letter 'K' (for example, 2155HB-A**K**__-__) or replace the letter 'D' with the letter 'J' (for example, 2155HB-A**J**__-__).

(5) Reduce by 0.5 space factor for 45 kW at 380…415V, 60 HP at 480V and 60…75 HP at 600V applications when circuit breaker suffix THM is selected.

Table 162 - Bulletin 2155H Space Factors with NEMA Type 1 Unit Options (refer to page 194…196)

Ratings (Amps)	NEMA Type 1 and 1 with Gasket											
	Standard Unit	With Option 13DSA_	With Option 13HIC	With Option 13IC	With Option 89CF	With Option 13IC and 13DSA_	With Option 13IC and 89CF	With Option 13HIC and 13DSA_	With Option 13HIC and 13IC	With Option 13HIC and 89CF	With Option 13HIC and 13IC and 13DSA_	With Option 13HIC and 13IC and 89CF
3…37	1.0	1.0	1.5	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5
43	1.5	1.5		1.5	1.5	1.5	1.5					
60									2.0		2.0	2.0
85			1.5 (2)	1.5 (2)		1.5 (2)	1.5 (2)	1.5 (2)		1.5 (2)		
108…135	2.5		3.5	2.5				3.5				
108…135(1)	3.0		4.0	3.0				4.0				

(1) Space factor when circuit breaker suffix THM is selected.
(2) 2.0 space factor for 45 kW at 380…415V, 60 HP at 480V and 60…75 HP at 600V applications, when used with circuit breaker types THM.

Table 163 - Bulletin 2155H Space Factors with NEMA Type 12 Unit Options (refer to page 194…196)

Ratings (Amps)	NEMA Type 12											
	Standard Unit	With Option 13DSA_	With Option 13HIC	With Option 13IC	With Option 89CF	With Option 13IC and 13DSA_	With Option 13IC and 89CF	With Option 13HIC and 13DSA_	With Option 13HIC and 13IC	With Option 13HIC and 89CF	With Option 13HIC and 13IC and 13DSA_	With Option 13HIC and 13IC and 89CF
3…37	1.0	1.0	1.5	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5
43	2.0	2.0	2.5	2.0	2.0	2.0	2.0	2.5	2.5	2.5	2.5	2.5
60	2.5	2.5	3.0	2.5	2.5	2.5	2.5	3.0	3.0	3.0	3.0	3.0
85	3.0(2)	3.0(2)	3.5(2)	3.5(2)	3.0(2)	3.5(2)	3.5(2)	3.5(2)	4.0(2)	3.5(2)	4.0(2)	4.0(2)
108…135	3.5		4.0	3.5				4.0				
108…135(1)			4.5					4.5				

(1) Space factor when circuit breaker THM is selected.

(2) Reduce by 0.5 space factor for 45 kW at 380…415V, 60 HP at 480V and 60…75HP at 600V applications when circuit breaker suffix THM is selected.

Bulletin 2154J and 2155J Soft Starter (SMC) Units - SMC Flex

These combination soft starter units are designed especially for use in CENTERLINE motor control centers. Each unit contains a microprocessor-controlled motor controller, control circuit transformer, and either a fusible disconnect switch or circuit breaker.

Features include:

- Seven standard modes of operation: soft start, current limit start, dual ramp, full voltage, linear speed acceleration, preset slow speed, and soft stop
- Optional modes of operation: pump control, Smart Motor Braking ™, Accu-Stop™, and slow speed with braking
- Integral SCR bypass
- Electronic overload protection with selectable trip class
- Full metering and diagnostics
- Four programmable auxiliary contacts
- DPI communication
- LCD display
- Keyboard programming
- High Interrupting Capacity Fuses (Option -13HIC) included on all units

Each unit is provided as a NEMA Class 1, Type B unit with terminal blocks mounted within the controller unit for connection of items such as remote pilot devices and input signals. Bulletins 2154J and 2155J are available in NEMA Type 1, NEMA Type 1 with gasket, and NEMA Type 12 construction. Each unit door includes a window for viewing the LCD display, except when door mounted human interface is provided. Class J time delay fuses provide branch circuit protection on 5…361 A Bulletin 2154J units. Class L time delay fuses provide branch circuit protection on 480 A Bulletin 2154J units. Instantaneous or varieties of inverse time (thermal magnetic) circuit breakers provide branch circuit protection on 2155J units. A variety of options such as isolation contactors, auxiliary contacts, pilot devices, protective modules, human interface modules, and network communication can be added to Bulletin 2154J and 2155J units. In some cases, extra space can be required to accommodate the optional equipment.

Catalog Number Explanation - Bulletin 2154J and 2155J Combination Soft Starter (SMC Flex) Unit

- Seven standard modes of operation: soft start, current limit, dual ramp, full-voltage, linear speed acceleration, preset slow speed, and soft stop
- Optional modes of operation: pump control, Smart Motor Braking, Accu-Stop, and slow speed with braking
- 5…480 A rating
- Built-in bypass contactor and overload relay
- NEMA Class I, Type B wiring with terminals mounted in unit

Table 164 -

2154J / 2155J	B	-	F108 / F108	L	K	B	-	49 / 49THM	-	** / **
Bulletin Number	Wiring Type		Current Rating		NEMA Type	Line Voltage		Horsepower/kW Code and Disconnecting Means		Options

Code	Type
2154J	SMC Flex Soft Starter (SMC) with Fusible Disconnect
2155J	SMC Flex Soft Starter (SMC) with Circuit Breaker

Code	Wiring Type
B	Type B

Code	Current Rating
F005	5 A
F025	25 A
F043	43 A
F060	60 A
F085	85 A
F108	108 A
F135	135 A
F201	201 A
F251	251 A
F317	317 A
F361	361 A
F480	480 A

Code	
L	Line Connected

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket without external reset button
J	NEMA Type 12 without external reset button

Code	Line Voltage
P	220…230V (1)
A	240V
N	380V (1)
KN	400V (1)
I	415V (1)
B	480V
C	600V

(1) Units at these voltages are not UL or C-UL listed.

Code	Options
See Options section beginning on page 191.	

Code	Horsepower/kW Code and Disconnecting Means
2154J-'49'	'49' Horsepower/kW code' See table on Page 314
2155J- '49THM	'49___' Horsepower/kW code '___THM' Circuit Breaker Type See tables on pages 314 and 321

Units—2154J Combination Soft Starter Motor Controller with Fusible Disconnect Switch (SMC Flex) - Line Connected

- See page 180 for product description.
- SMC Flex units are configured as line connected, for Delta connected contact factory.
- Isolation contactor (-13IC) is optional. Select on page 195. The addition of this option can require additional space. See Table 166, for space factor of units with option.
- Basic configuration includes power fuses.
- Control circuit transformer included.
- Bulletin 150 SMC Flex controllers are cULus (UL and C-UL listed) as motor overload protective devices. An external overload relay is not required for single motor applications.
- See page 357 for short circuit withstand ratings.

Table 165 - Bulletin 2154J Units

Rating (Amps)	Nominal Horsepower (Nominal kW) The horsepower and kW ratings shown are nominal. The limiting factor in the application and use of the SMC Flex is the output ampere rating.					Disc. Rating	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
	220…230V (1)	240V	380…415V (1)	480V	600V (2)		Space Factor	Catalog Number (5) Wiring Type B— Class I	Space Factor	Catalog Number (5) Wiring Type B— Class I	
5	(0.25…1.1)	0.5… 1	(0.37…2.2	0.5… 3	0.75… 3	30	2.0	2154JB-F005LK_-___	3.0	2154JB-F005LJ_-___	SC
25	(1.5…5.5)	1.5… 7.5	(3.7…11)	5…15	5…20	30		2154JB-F025LK_-___		2154JB-F025LJ_-___	
43	(7.5…11)	10… 15	(15…22)	20… 30	25…40	60		2154JB-F043LK_-___		2154JB-F043LJ_-___	
60	(15)	20	(30)	40	50	100	2.5	2154JB-F060LK_-___		2154JB-F060LJ_-___	
85	(18.5…22)	25… 30	(37)	50	—	100		2154JB-F085LK_-___		2154JB-F085LJ_-___	
	—	—	(45)	60	60…75	200			3.5		
108	(30)	40	(55)	75	100	200	3.5	2154JB-F108LK_-___	4.0	2154JB-F108LJ_-___	
135	(37)	50	—	100	125	200		2154JB-F135LK_-___		2154JB-F135LJ_-___	
201	(45…55)	60… 75	(75…90)	125… 150	150… 200	400	6.0(3), 20″ W	2154JB-F201LK_-___	6.0(3), 20″ W	2154JB-F201LJ_-___	SC-II
251	(75)	100	(110…132)	200	250	400		2154JB-F251LK_-___		2154JB-F251LJ_-___	
317	(90)	125	(150…160)	250	300	400	6.0(4), 20″ W, 20″ D	2154JB-F317LK_-___	6.0(4), 20″ W, 20″ D	2154JB-F317LJ_-___	
361	(110)	150	(185)	300	350	600		2154JB-F361LK_-___		2154JB-F361LJ_-___	
480	(132)	200	(200…250)	350… 400	400… 500	600		2154JB-F480LK_-___		2154JB-F480LJ_-___	

(1) Units at these voltages are not UL listed or CSA certified.

(2) Delivery program is PE-II in the United States and SC-II in Canada.

(3) Frame mounted unit, section does not have vertical wireway. The design of these units is optimized for bottom entry of load cables. For top entry of load cables, consult the factory.

(4) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5″ deeper than standard. The design of these units is optimized for bottom entry of load cables. For top entry of load cables, consult the factory.

(5) The catalog numbers listed are not complete:

- Select the control voltage code from table on page 313 to identify the preferred control voltage (for example, 2154JB-F108LK**B**).
- If horsepower rated, select the number from table on page 315 that corresponds to the nominal horsepower desired, (for example, 2154JB-F108LKB-**49**).
- If kW rated, select the number from table on page 315 that corresponds to the nominal kW desired, (for example, 2154JB-F108LKN-**49K**).

Table 166 - Bulletin 2154J Space Factors with Unit Options

Rating (Amperes)	Space Factor for NEMA Type 1 and Type 1 w/ gasket Units				Space Factor for NEMA Type 12 Units			
	Standard Unit	With Option 13GF	With Option 13IC	With Options 13GF and 13IC	Standard Unit	With Option 13GF	With Option 13IC	With Options 13GF and 13IC
5	2.0				3.0			
25								
43								
60	2.5							
85					3.0 / 3.5 (1)			
108	3.5				4.0			
135	3.5				4.0			
201	6.0, 20″ W				6.0, 20″ W			
251	6.0, 20″ W				6.0, 20″ W			
317	6.0, 20″ W, 20″ D			6.0, 25″ W, 20″ D	6.0, 20″ W, 20″ D			6.0, 25″ W, 20″ D
361	6.0, 20″ W, 20″ D		6.0, 25″ W, 20″ D		6.0, 20″ W, 20″ D		6.0, 25″ W, 20″ D	
480	6.0, 20″ W, 20″ D		6.0, 30″ W, 20″ D		6.0, 20″ W, 20″ D		6.0, 30″ W, 20″ D	

(1) Requires 3.5 space factor for 45 kW at 380…415V, 60 HP at 480V and 60…75 HP at 600V.

Units—2155J Combination Soft Starter Motor Controller with Circuit Breaker (SMC Flex) - Line Connected

- See page 180 for product description.
- SMC Flex units are configured as line connected, for Delta connected contact factory.
- Isolation contactor (-13IC) is optional. Select on page 195. The addition of this option can require additional space. See page 190 for space factor of units with options.
- Control circuit transformer included.
- Bulletin 150 SMC Flex controllers are cULus (UL and C-UL listed) as motor overload protective devices. An external overload relay is not required for single motor applications.
- See page 357 for short circuit withstand ratings. Fusing is required.

Table 167 - Bulletin 2155J Units

Rating (Amps)	Nominal Horsepower (Nominal kW) The horsepower and kW ratings shown are nominal. The limiting factor in the application and use of the SMC Flex is the output ampere rating.					NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
	220…230V (1)	240V	380V…415V (1)	480V	600V (2)	Space Factor	Catalog Number (5) Wiring Type B— Class I	Space Factor	Catalog Number (5) Wiring Type B— Class I	
5	(0.25…1.1)	0.5…1	(0.37…2.2)	0.5…3	0.75…3	2.0	2155JB-F005LK_-___	3.0	2155JB-F005LJ_-___	SC
25	(1.5…5.5)	1.5…7.5	(3.7…11)	5…15	5…20		2155JB-F025LK_-___		2155JB-F025LJ_-___	
43	(7.5…11)	10…15	(15…22)	20…30	25…40		2155JB-F043LK_-___		2155JB-F043LJ_-___	
60	(15)	20	(30)	40	50		2155JB-F060LK_-___		2155JB-F060LJ_-___	
85	(18.5…22)	25…30	(37)	50…60	60…75		2155JB-F085LK_-___		2155JB-F085LJ_-___	
	—	—	(45)	—	—	2.5		3.0(6)		
108	(30)	40	(55)	75	100		2155JB-F108LK_-___	3.5	2155JB-F108LJ_-___	
135	(37)	50	—	100	125		2155JB-F135LK_-___		2155JB-F135LJ_-___	
201	(45…55)	60…75	(75…90)	125…150	150…200	6.0(3), 20″ W	2155JB-F201LK_-___	6.0(3), 20″ W	2155JB-F201LJ_-___	SC-II
251	(75)	100	(110…132)	200	250		2155JB-F251LK_-___		2155JB-F251LJ_-___	
317	(90)	125	(150…160)	250	300	6.0 (4) 20″ W, 20″ D	2155JB-F317LK_-___	6.0 (4) 20″ W, 20″ D	2155JB-F317LJ_-___	
361	(110)	150	(185)	300	350		2155JB-F361LK_-___		2155JB-F361LJ_-___	
480	(132)	200	(200…250)	350…400	400…500		2155JB-F480LK_-___		2155JB-F480LJ_-___	

(1) Units at these voltages are not UL listed or CSA certified.

(2) Delivery program is PE-II in the United States and SC-II in Canada.

(3) Frame mounted unit, section does not have vertical wireway next to this unit. The design of these units is optimized for bottom entry of load cables. For top entry of load cables, consult the factory.

(4) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5″ deeper than standard. The design of these units is optimized for bottom entry of load cables. For top entry of load cables, consult the factory.

(5) The catalog numbers listed are not complete:
- Select the control voltage code from table on page 313 to identify the preferred control voltage (for example, 2155JB-F108LK**B**).
- If horsepower rated, select the number from table on page 314 that corresponds to the nominal horsepower desired, (for example, 2155JB-F108LKB-**49**).
- If kW rated, select the number from table on page 315 that corresponds to the nominal kW desired, (for example, 2155JB-F108LKN-**49K**).
- Select the appropriate suffix from the table on page 321 to identify the circuit breaker type (for example, 2155JB-F108LKB-49**TJM** or 2155JB-F108LKB-49K**TJM**).

(6) Requires minimum of 3.5 space factors for 45 kW at 380…415V when circuit breaker suffix THM is selected.

Table 168 - Bulletin 2155J Space Factors with Unit Options

Rating (Amps)	Space Factor for NEMA Type 1 and Type 1 w/gasket Units							
	Standard Unit	With Option 13GF	With Option 13IC	With Options 13GF and 13IC	With Option 13HIC	With Options 13GF and 13HIC	With Options 13IC and 13HIC	With Options 13GF, 13IC and 13HIC
5	2.0							2.5
25								
43	2.0					2.5	2.0	
60						2.5		
85	2.0				2.0 (3)	2.5		
	2.5 (2)							3.0 (2)
108…135	2.5	3.0	2.5	3.0	3.5			
108…135 (1)	3.0	3.5	3.0	3.5	4.0			
201	6.0, 20″ W							
251	6.0, 20″ W							
317	6.0, 20″ W, 20″ D						6.0, 25″ W, 20″ D	
361	6.0, 20″ W, 20″ D						6.0, 25″ W, 20″ D	
480	6.0, 20″ W, 20″ D		6.0, 30″ W, 20″ D					

Rating (Amps)	Space Factor for NEMA Type 12 Units							
	Standard Unit	With Option 13GF	With Option 13IC	With Options 13GF and 13IC	With Option 13HIC	With Options 13GF and 13HIC	With Options 13IC and 13HIC	With Options 13GF, 13IC and 13HIC
5	3.0							
25								
43								
60	3.0						3.5	
85	3.5 (2)							
108…135	3.5				4.0			
108…135 (1)	3.5	4.0	3.5	4.0	4.5			
201	6.0, 20″ W							
251	6.0, 20″ W							
317	6.0, 20″ W, 20″ D						6.0, 25″ W, 20″ D	
361	6.0, 20″ W, 20″ D						6.0, 25″ W, 20″ D	
480	6.0, 20″ W, 20″ D		6.0, 30″ W, 20″ D					

(1) Space factor when circuit breaker suffix THM is selected.

(2) Space factor for 45kW applications at 380…415V when circuit suffix THM is selected.

(3) The following combination of option requires 2.5 space factors: Options 89_ **and** 4T_ or 4TL_ or 5TL **and** 9_ (without Option 13IC).

Factory-Installed Options, Modifications, Accessories for Combination Soft Starter (SMC) Units

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 169 - Bulletins 2154 and 2155 Push Button, Control Station Housing, and Pilot Light Options

Option	Description		SMC-3 (9)		SMC Flex		Option Number	Delivery Program
			2154H	2155H	2154J	2155J		
Push Buttons (1),(2)	START-STOP (6)		✓	✓	✓(10)	✓(10)	-1	SC
	STOP		✓	✓	✓(10)	✓(10)	-1B	
	START-STOP and SOFT STOP	**IMPORTANT:** When SMC Flex option 13XB is selected, the only push button option that can be selected is 1XB. When SMC Flex option 13XD is selected, the only push button options that can be selected are 1XD, 1XE, or 1XF			✓ (10)	✓ (10)	-1XA	SC
	START-STOP and PUMP STOP				✓ (11)	✓ (11)	-1XB	PE
	START-STOP and SLOW SPEED				✓ (10)	✓ (10)	-1XC	SC
	START-STOP and BRAKE				✓ (12)	✓ (12)	-1XD	PE
	START-STOP and ACCU-STOP				✓ (12)	✓ (12)	-1XE	
	START-STOP, SLOW SPEED and BRAKE				✓ (12), (13)	✓ (12), (13)	-1XF	
Control Station Housing (3)	Blank		✓	✓	✓	✓	-2	SC
	1 hole—for one pilot device		✓	✓	✓	✓	-2A	
	2 holes—for two pilot devices		✓	✓	✓	✓	-2B	
	3 holes—for three pilot devices		✓	✓	✓	✓	-2C	
	4 holes—for four pilot devices		✓				-2D (14)	
Selector Switch (1),(4),	HAND-OFF-AUTO		✓	✓	✓	✓	-3	
	OFF-ON		✓	✓	✓	✓	-3E (2)	
Selector Switch (1), (5)	HAND-OFF-AUTO for Soft Stop (7)				✓	✓	-3XA	SC
	HAND-OFF-AUTO for Pump Control				✓	✓	-3XB	PE
	HAND-OFF-AUTO for Smart Motor Braking (8)				✓	✓	-3XD	

(1) Maximum one switch per unit. Push buttons cannot be used in conjunction with selector switches. When three or less pilot devices are selected, Bulletin 800T pilot devices are supplied, except selector switches are Bulletin 800H devices. Generally, when more than three pilot devices are selected, Bulletin 800F pilot devices are supplied. For 0.5 space factor units, Bulletin 800F pilot devices are supplied. Maximum four pilot devices on 0.5 space factor units. Only one push button or selector switch option can be selected.

(2) Mutually exclusive with 13GC, 13GD, 13GE, 13GR and 13DSA_.

(3) Available only on units without pilot devices. Holes are for Bulletin 800T pilot devices when unit is 1.0 space factor and larger. Holes are for Bulletin 800F pilot devices when unit is 0.5 space factor.

(4) Selector switches 3 and 3E are not available when option 13XB or 13XD is selected.

(5) These selector switches can only be used with corresponding control options (for example, -3XA used only with standard starting mode, -3XB used only for 13XB and 3XD only used for 13XD).

(6) Two Bulletin 800F pilot lights are supplied when two pilot lights are selected in conjunction with two push buttons.

(7) Selector switch option 3XA functions when SMC Flex is operating in Soft Stop mode. Consult factory if SMC Flex is operating in Preset Slow Speed mode.

(8) Selector switch option 3XD functions when SMC Flex is operating in Smart Motor Braking mode. Consult factory if SMC Flex is operating in Accu-Stop or Slow Speed Braking mode.

(9) Pilot devices for 0.5 space factor units are Bulletin 800F. A minimum of 1.0 space factor is required for SMC-3 units when more than four pilot devices are required.

(10) Can only be used with standard starting mode for SMC Flex.

(11) Can only be used with Pump Control option 13XB for SMC Flex.

(12) Can only be used with Smart Motor Braking, Accu-Stop and Slow Speed with Braking option 13XD for SMC Flex.

(13) Option 1XF cannot be used with ON/OFF and fault pilot lights for SMC Flex.

(14) Not available for 1.0 space factor and larger units.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

To select pilot light lens color, add letters to the option number: A = amber, B = blue, C = clear, G = green, R = red, W = white (for example, 4RG is a red ON and green OFF pilot light). Clear and white are not available for Bulletin 800T LED type pilot lights. Clear is not available on Bulletin 800F LED pilot lights. White is not available on Bulletin 800F incandescent pilot lights.

Table 170 - Bulletins 2154 and 2155 Pilot Light Options

Option	Description		SMC-3 (2)		SMC Flex		Option Number	Delivery Program
			2154H	2155H	2154J	2155J		
Pilot Lights (Transformer Type for 800T, Full-voltage for 800F)(1)	Standard type	ON	✓(3)	✓(3)	✓(6)	✓(6)	-4_	SC
		ON-OFF	✓(4)	✓(4)	✓(6)	✓(6)	-4_ _	
		FAULT	✓(5)	✓(5)	✓	✓	-4T_	
	LED type	ON	✓(3)	✓(3)	✓(6)	✓(6)	-4L_	
		ON-OFF	✓(4)	✓(4)	✓(6)	✓(6)	-4L_ _	
		FAULT	✓(5)	✓(5)	✓	✓	-4TL_	
	Push-To-Test Standard Type	ON	✓(3)	✓(3)	✓(6)	✓(6)	-5_	
		ON-OFF	✓(4)	✓(4)	✓(6)	✓(6)	-5_ _	
		FAULT	✓(5)	✓(5)	✓	✓	-5T_	
	Push-To-Test LED Type	ON	✓(3)	✓(3)	✓(6)	✓(6)	-5L_	
		ON-OFF	✓(4)	✓(4)	✓(6)	✓(6)	-5L_ _	
		FAULT	✓(5)	✓(5)	✓	✓	-5TL_	

(1) When three or less pilot devices are selected, Bulletin 800T pilot devices are supplied, except selector switches are Bulletin 800H devices. Generally, when more than three pilot devices are selected, Bulletin 800F pilot devices are supplied. For 0.5 space factor units, Bulletin 800F pilot devices are supplied. Maximum four pilot devices on 0.5 space factor units.

(2) Pilot devices for 0.5 space factor units are Bulletin 800F. A minimum of 1.0 space factor is required for SMC-3 units when more than four pilot devices are required.

(3) Select two N.O. auxiliary contacts (option 900) for SMC-3 units with ON light and DeviceNet Starter Auxiliary (option 13DSA_) when isolation contactor (option 13IC) is not selected.
Select one N.O. auxiliary contacts (option 90) for SMC-3 units with ON light and DeviceNet Starter Auxiliary (option 13DSA_) and when isolation contactor (option 13IC) is selected.

(4) Select one N.O. and one N.C. auxiliary contact (option 901) when isolation contactor (option 13IC) is not selected.
Select one N.C. auxiliary contact (option 91) when isolation contactor (option 13IC) is selected.
If used with DeviceNet Starter Auxiliary (option 13DSA_), select isolation contactor (option 13IC) and two N.O. contacts and one N.C. auxiliary contact (option 9001).

(5) Not available with DeviceNet Starter Auxiliary (Option 13DSA3).

(6) Select one N.O. auxiliary contact (Option 90) when ON pilot light is selected for SMC Flex units.
Select one N.O. and one N.C. auxiliary contact (Option 90 and 91) when ON-OFF pilot lights are selected for SMC Flex units.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 171 - Bulletins 2154 and 2155 Converter Modules, and Line and Load Protection Modules Options

Option	Option Number	Description				SMC-3		SMC Flex		Delivery Program
						2154H	2155H	2154J	2155J	
Protective Modules	-13D	Protective module contains capacitors and metal oxide varistors (MOVs) which protect the internal power circuitry from severe electrical transients and high electrical noise	Line Side	480V MAX	3…37 A	✓	✓			SC
					43…85 A	✓	✓			
					108…135 A	✓	✓			
					5…85 A			✓	✓	
					108…480 A			✓	✓	
				600V	3…37 A	✓	✓			PE in U.S., SC in Canada
					43…85 A	✓	✓			
					108…135 A	✓	✓			
					5…85 A			✓	✓	
					108…480 A			✓	✓	
	-13E (1)		Load Side	480V MAX	43…85 A	✓	✓			SC
					108…135 A	✓	✓			
					5…85 A			✓	✓	
					108…480 A			✓	✓	
				600V	43…85 A	✓	✓			PE in U.S., SC in Canada
					108…135 A	✓	✓			
					5…85 A			✓	✓	
					108…480 A			✓	✓	

(1) Load side protective module not allowed with pump control (-13XB) or braking control (-13XD) options; see Table 173 for details.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 172 - Bulletins 2154 and 2155 Communication, HIM, and HIC Fusing Options

Option	Option Number	Description			SMC-3		SMC Flex		Delivery Program
					2154H	2155H	2154J	2155J	
DeviceNet Starter Auxiliary (mutually exclusive) (1)	-13DSA2	Four 120V AC inputs and two 120V AC outputs for DeviceNet.			✓	✓	✓(5)	✓(5)	SC
	-13DSA3	Four 24V DC inputs and two 120V AC outputs for DeviceNet.			✓	✓	✓(5)	✓(5)	
Communication Modules (mutually exclusive)	-13GC	ControlNet communication module. Mounted internal to SMC Flex. Includes one 1786-TPYS tap, supplied loose for customer mounting.					✓	✓	
	-13GD(3)	DeviceNet communication module. Mounted internal to SMC Flex.					✓	✓	
	-13GE(4)	Ethernet communication module. Mounted internal to SMC Flex.					✓	✓	
	-13GR	Single Point Remote I/O					✓	✓	
Ground Fault Current Transformer	-13GF	Provides ground fault core balance current transformer for ground fault indication.					✓	✓	
Human Interface Module (HIM) (mutually exclusive)	-13HBA0	Blank Cover. No functionality	Door mounted in bezel. Cable to SMC Flex unit included. No window on door. Available on NEMA Type 1 and Type 1 with gasket only.				✓	✓	SC
	-13HBA3	LCD display, full numeric keypad					✓	✓	
	-13HBA5	LCD display programmer only					✓	✓	
	-13HC3S	LCD display, full numeric keypad	Door mounted. HIM is not removable from bezel. One HIM required per SMC Flex unit. No window on door. Available on NEMA 12 only.				✓	✓	
	-13HC5S	LCD display programmer only					✓	✓	
High Interrupting Capacity Fuses (Class J - Time Delay)(2)	-13HIC	Provides unit with high interrupting capacity fuses for increased short circuit withstand rating. See page 357 for short circuit withstand ratings of Bulletin 2155J units with this option.		Class J - Time Delay	3…19 A		✓			
					25…37 A		✓			
					43…60 A		✓			
					85…108 A		✓			
					135 A		✓			
					5 A			✓		
					25 A			✓		
					43…60 A			✓		
					85…108 A			✓		
					135…201 A			✓		
					251…361 A			✓		
				Class L - Time Delay	480 A			✓		

(1) Not available with push buttons, selector switch (option 3E), and control relays (option 89C_ or 89P_). The addition of DeviceNet Starter Auxiliary (option 13DSA_) increases space factor of 2154H and 2155H SMC-3 units. See page 182 and page 183. Select one N.O. auxiliary contact (Option 90) when used with Bulletin 2154J and 2155J.

(2) Adding this option requires additional space for Bulletin 2155H units, see page 183 for space factors of units with this option. Adding this option requires additional space for Bulletin 2155J units, see page 190 for space factors of units with this option.

(3) Not available on Ethernet IntelliCENTER order.

(4) Not available for DeviceNet IntelliCENTER orders.

(5) When specifying options 13DSA2 or 13DSA3 with Bulletin 2154J and 2155J units, option 13GD must also be specified.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 173 - Bulletins 2154 and 2155 Isolation Contactor, SCR Fusing, and SMC Flex Control Mode Options

Option	Option Number	Description		SMC-3		SMC Flex		Delivery Program
				2154H	2155H	2154J	2155J	
Add Isolation Contactor (1)	-13IC	Provides unit with Bulletin 100 isolation contactor.	3…19 A	✓	✓	✓	✓	SC
			24 A, 25 A	✓	✓	✓	✓	
			30…37 A	✓	✓			
			43 A	✓	✓	✓	✓	
			54…60 A	✓	✓	✓	✓	
			85 A	✓	✓	✓	✓	
			97…108 A	✓	✓	✓	✓	
			135…180 A	✓	✓	✓	✓	
			201…251 A			✓	✓	
			317…361 A			✓	✓	
			480…500 A			✓	✓	
Standard Starting Mode (2), (3)	—	This starting mode group provides soft start, soft stop, current limit, full voltage, kick start, preset slow speed, linear speed start and stop, and dual ramp. Refer to SMC Flex section of publication A117-CA001 for detailed description of modes of operation.	5…480 A			✓	✓	
Pump Control (2), (4)	-13XB	This starting mode provides pump start and stop in addition to soft start, soft stop, current limit, full voltage, and kick start. Refer to SMC Flex section of publication A117-CA001 for detailed description of modes of operation.	5…480 A			✓	✓	PE
Braking Control Smart Motor Braking, Accu-Stop, and Slow Speed Braking (2), (5)	-13XD	This starting mode provides Smart Motor Braking, Accu-Stop, and Slow Speed Braking in addition to soft start, soft stop, current limit, full voltage, kick start, and preset slow speed. Refer to SMC Flex section of publication A117-CA001 for detailed description of modes of operation.	5…85 A			✓	✓	
			108 A			✓	✓	
			135 A			✓	✓	
			201 A			✓	✓	
			251 A			✓	✓	
			317 A			✓	✓	
			361 A			✓	✓	
			480 A			✓	✓	

(1) Adding this option increases the space factor of the unit.
- For Bulletin 2154H, see page 182, for Bulletin 2155H, see page 183.
- For Bulletin 2154J, see page 188, for Bulletin 2155J, see page 190.

(2) Soft Start, Pump Stop, Smart Motor Braking, Accu-Stop, and slow speed with braking are not intended to be used as an emergency stop.

(3) Push Button option 1XA and 1XC and selector switch option 3XA can only be used with standard starting mode and are the only push button and selector switch options that can be selected with standard starting mode.

(4) Push button option 1XB and selector switch option 3XB can only be used with Pump Control (Option 13XB) and are the only push button and selector switch options that can be selected with Pump Control.

(5) Push button option 1XD, 1XE and 1XF and selector switch option 3XD can only be used with Smart Motor Braking, Accu-Stop, and Slow Speed with Braking (Option 13XD) and are the only push button and selector switch options that can be selected for Smart Motor Braking, Accu-Stop, and Slow Speed with Braking (Option 13XD).

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 174 - Bulletins 2154 and 2155 Grounding and Control Relay Options

Option	Option Number	Description			SMC-3		SMC Flex		Delivery Program
					2154H	2155H	2154J	2155J	
Surge Suppressor	-17R	Provides surge suppressor across coil of unwired control relays (option 89CF or 89P)			✓	✓	✓	✓	SC
Omit Wiring	-19	Omission of control wiring			✓	✓	✓	✓	
Grounded Unit Door	-79GD	Hinge mounted ground strap mounted on bottom hinge of unit door. Unit door hinge grounding strap for IEC requirements.			✓	✓	✓	✓	
Unit Load Connector	-79L	Specify on all plug-in units in sections with vertical unit load ground bus		Unplated copper	✓	✓	✓	✓	
	-79LT(4)			Tin plated copper	✓	✓	✓	✓	
Unit Ground Stab	—	Specify on plug-in units in sections with vertical plug-in ground bus. Copper unit ground stabs also may be used with steel vertical ground bus.		Copper alloy	✓	✓	✓	✓	
	-79U			Unplated copper	✓	✓	✓	✓	
	-79UT(4)			Tin plated copper	✓	✓	✓	✓	
Unwired Control Relay (1), (2), (3)	-89CF40	Bulletin 700CF 4-Pole Relay		4 N.O.	✓	✓	✓	✓	SC
	-89CF31			3 N.O. and 1 N.C.	✓	✓	✓	✓	
	-89CF22			2 N.O. and 2 N.C.	✓	✓	✓	✓	
	-89CF40A	Bulletin 700CF 4-Pole Relay with Time Attachment 0.3…30 s	On Delay Includes one NOTC and one NCTO Contact	4 N.O.	✓	✓	✓	✓	
	-89CF22A			2 N.O. and 2 N.C.	✓	✓	✓	✓	
	-89CF40B		Off Delay Includes one NOTO and one NCTC Contact	4 N.O.	✓	✓	✓	✓	
	-89CF22B			2 N.O. and 2 N.C.	✓	✓	✓	✓	
	-89CF40C	Bulletin 700CF 4-Pole Relay with Time Attachment 1.8 …180 s	On Delay Includes one NOTC and one NCTO Contact	4 N.O.	✓	✓	✓	✓	
	-89CF22C			2 N.O. and 2 N.C.	✓	✓	✓	✓	
	-89CF40D		Off Delay Includes one NOTO and one NCTC Contact	4 N.O.	✓	✓	✓	✓	
	-89CF22D			2 N.O. and 2 N.C.	✓	✓	✓	✓	
	-89CF40L	Bulletin 700CF 4-Pole Relay with Mechanical Latch Attachment		4 N.O.	✓	✓	✓	✓	PE
	-89CF22L			2 N.O. and 2 N.C.	✓	✓	✓	✓	
	-89P2	Bulletin 700P Relay		2 N.O.			✓	✓	SC
	-89P4			4 N.O.			✓	✓	
	-89PT	Bulletin 700P with Pneumatic Time Delay Attachment (on/off delay) with two timed contacts (0.1…60 s)		None			✓	✓	PE
	-89PT2			2 N.O.			✓	✓	
	-89PT4			4 N.O.			✓	✓	
	-89PL2	Bulletin 700P Relay with Mechanical Latch Attachment		2 N.O.			✓	✓	

(1) Mutually exclusive with DeviceNet Starter Auxiliary (option 13DSA_). The addition of unwired control relay (option 89CF) increases the space factor of 2154H SMC-3 units. See page 182.

(2) Instantaneous contacts on Bulletin 700CF relays are non-convertible Bulletin 700P relays have instantaneous contacts that are convertible from normally open to normally closed.

(3) 2.5 space factor required when selecting Bulletin 2113B-E with E1+ Overload Relay

(4) Unit Load Ground Connector and Unit Ground Stab plating must match, horizontal and vertical ground bus plating

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 175 - Bulletins 2154 and 2155 Auxiliary Contact Options

Option	Option Number	Description	SMC-3		SMC Flex		Delivery Program
			2154H	2155H	2154J	2155J	
Auxiliary Contacts Type B Wiring	-90	Normally Open—One N.O. auxiliary contact mounted on isolation contactor (13IC) when supplied	✓(2)	✓(2)	✓(3)	✓(3)	SC
	-91	Normally Closed—One N.C. auxiliary contact mounted on isolation contactor (13IC) when supplied	✓(2)	✓(2)	✓(3)	✓(3)	
	-98 (1)	Normally Open—One N.O. mounted on operating mechanism (operates with movement of external handle only)	✓	✓	✓	✓	
	-99 (1)	Normally Closed—One N.C. mounted on operating mechanism (operates with movement of external handle only)	✓	✓	✓	✓	
	-790K	One Form C Aux mounted internally in Circuit Breaker		✓		✓	
	-790L	Two Form C Aux mounted internally in Circuit Breaker		✓		✓	
	-790A	One Form C Aux, One Form C Alarm mounted internally in Circuit Breaker		✓		✓	
	-790T	One Form C Alarm mounted internally in Circuit Breaker		✓		✓	
	-790B	Two Form C Aux, One Form C Alarm mounted internally in Circuit Breaker		✓		✓	

(1) The maximum number of auxiliary contacts that can be supplied is two in any combination. Contacts actuate with movement of unit handle to ON or OFF position only. Contacts are not designed to actuate as a result of a circuit breaker trip. For such applications, auxiliary contacts -790K (G, H, and J) and -790A (all other frames)'mounted internally' must be selected. Auxiliary contacts are supplied unwired.

(2) The following apply to auxiliary contacts for Bulletin 2154H and 2155H SMC-3 units:
- Bulletin 150 SMC-3 controller includes one N.O. auxiliary contact set to NORMAL (unless otherwise specified below).
- When isolation contactor (option -13IC) is not selected, the maximum number of auxiliary contacts is two in the following combinations two N.O. or one N.O. and one N.C. The auxiliary contacts are side-mounted on the SMC-3 and set to NORMAL. The standard SMC-3 N.O. auxiliary contact is set for AT SPEED and is not used.
- When isolation contactor (option -13IC) is selected, the maximum number auxiliary contacts is four in any combination (except three N.C, four N.C., or one N.O. and three N.C.). These auxiliary contacts are on the isolation contactor. The standard SMC-3 N.O. auxiliary contact is set for NORMAL and is used to control the isolation contactor.
- When ON pilot light or DeviceNet Starter Auxiliary (option -13DSA_) is selected in SMC-3 units, without an isolation contactor and without any additional auxiliary contacts, the standard SMC-3 N.O. auxiliary contact will be used and set to NORMAL.
- When ON pilot light or DeviceNet Starter Auxiliary (option -13DSA_) is selected in SMC-3 units, without an isolation contactor, only one additional N.O. or N.C. contact can be selected, select two N.O. auxiliary contacts (option -900) or one N.O. and one N.C. auxiliary contacts (option -901). The auxiliary contacts are side-mounted on the SMC-3 and set to NORMAL. The standard SMC-3 N.O. auxiliary contact is set for AT SPEED and is not used.
- When ON pilot light and DeviceNet Starter Auxiliary (option -13DSA_) are selected in SMC-3 units, select two N.O. auxiliary contacts (option -900). Without an isolation contactor (option-13IC) the auxiliary contacts are side-mounted on the SMC-3 and set to NORMAL. The standard SMC-3 N.O. auxiliary contact is set for AT SPEED and is not used.
- When ON-OFF pilot lights are selected on SMC-3 units, select one N.O. auxiliary contact and one N.C. auxiliary contact (option -901). Without an isolation contactor (option-13IC) the auxiliary contacts are side-mounted on the SMC-3 and set to NORMAL. The standard SMC-3 N.O. auxiliary contact is set for AT SPEED and is not used.
- When ON-OFF pilot lights and DeviceNet Starter Auxiliary (option -13DSA_) are selected on SMC-3 units, select two N.O. and one N.C. auxiliary contact (option -900-91).
  IMPORTANT: this number of auxiliary contacts requires the selection of an isolation contactor (option -13IC).

(3) The following apply to auxiliary contacts for Bulletin 2154J and 2155J SMC Flex units:
- When isolation contactor (Option 13IC) is selected, the maximum number of auxiliary contacts is four in any combination (except three N.C, four N.C., or one N.O. and three N.C.).
- When isolation contactor (Option 13IC) is **not** selected, the maximum number of auxiliary contacts is four in the following combinations: two N.O./two N.C., three N.O./one N.C., four N.O. or four N.C.
- When ON pilot light is selected on SMC Flex units, select one N.O. auxiliary contact (option -90).
- When ON-OFF pilot lights are selected on SMC Flex units, select one N.O. and one N.C. auxiliary contact (option -90 and -91).
- When DeviceNet Starter Auxiliary (-13DSA_) is selected on SMC Flex units, select one N.O. auxiliary contact (option -90).

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 176 - Bulletins 2154 and 2155 T-handle, Control Circuit, Wire Marker, Shunt Trip, and Legend Options

Option	Option Number	Description		SMC-3		SMC Flex		Delivery Program
				2154H	2155H	2154J	2155J	
T-handle	-111	T-handle latch on unit door		✓	✓	✓	✓	SC
Arc Resistant Latches	-112	Requires arc resistant MCC		✓	✓	✓	✓	
Control Circuit Wiring (1)	—	Type MTW (TEW) 90°C #16 AWG copper wire, VW1 rated		✓	✓	✓	✓	
	-750	Type MTW (TEW) 90°C #14 AWG (tinned) copper wire, VW1 rated		✓ (4)	✓ (4)	✓	✓	
	-750B	Tinned Power wire and #14Awg, tinned, MTW control wire		✓ (4)	✓ (4)	✓	✓	SC (+2 days)
	-750S	Type SIS 90°C #14 AWG (tinned) copper wire		✓ (4)	✓ (4)	✓	✓	
Control Circuit Ring Lugs	-750RL (2)	Insulated ring lugs for control wires where possible		✓	✓	✓	✓	
Control Circuit Spade Lugs	-750SL (2)	Insulated spade lugs for control wires where possible		✓	✓	✓	✓	
Control Wire Markers	-751D	Adhesive Brady Datab type markers at each end of control wire. Not available in Canada.		✓	✓	✓	✓	SC
	-751HS	Heat shrink type marker at each end of control wire		✓	✓	✓	✓	SC (+2 days)
	-751S	Sleeve type marker at each end of control wire		✓	✓	✓	✓	SC
Shunt Trip	-754 (3)	For tripping circuit breakers from remote 120V, 60 Hz source			✓		✓	
French Legend Plates	-860F	Legend plates printed in French are available on all pilot devices. Specify 860F when pilot device option is selected.		✓	✓	✓	✓	
Spanish Legend Plates	-860S	Legend plates printed in Spanish are available on all pilot devices. Specify 860S when pilot device option is selected.		✓	✓	✓	✓	
Unit Door Nameplates	—	Door Nameplate Screws	Plated steel nameplate screws. Provided when cardholder or nameplates are not selected.	✓	✓	✓	✓	
		Card Holder for Unit Doors	1.125'' x 3.625'' plastic card holders with blank cards	✓	✓	✓	✓	SC-II
		1.125″ × 3.625″ engraved 3-line or 4-line nameplate	Acrylic plate (available in U.S. only). Lettering is white with black letters or black with white letters.	✓	✓	✓	✓	
			Phenolic plate. Lettering is white with black letters, black with white letters, or red with white letters.	✓	✓	✓	✓	
Stainless Steel Nameplate Screws	—	Stainless steel nameplate screws for unit nameplates (2 per unit)		✓	✓	✓	✓	
Export Packing Below Deck	—	Container is skid mounted and packaged in clear plastic. Packing is not watertight or waterproof. Take consideration if extended storage is expected.		✓	✓	✓	✓	SC-II (+2 days)

(1) Options for factory wiring of control circuits. Device and component internal wiring and wiring that could affect operation or certification (for example, insulation temperature class, EMC shielding requirements, communication requirements, UL, C-UL, CSA, CE) are not included.

(2) Examples of where insulated lugs cannot be used include SMC terminals, Bulletin 800F pilot devices, 700CF relays, disconnects/circuit breakers, and areas where more than one wire per terminal is required.

(3) Not available when two N.O. and two N.C. (form C) internal contacts are selected for circuit breakers.

(4) Requires 0.5 space factor SMC-3 units to be increased to 1.0 space factor.

Chapter 15

Variable Frequency AC Motor Drive Units

Bulletin 2162Q and 2163Q with PowerFlex 70 Drive

These combination variable frequency AC motor drive units are specifically designed for use in CENTERLINE motor control centers. Each unit contains a high performance, microprocessor-controlled, variable frequency AC drive and either a fusible disconnect switch or a circuit breaker.

They also:

- Include isolated logic and power.
- Include fans and venting where required. See page 362.
- Include internal electronic overload protection.
- Include EMC filters on 380…415V AC.
- Include UL Class J time delay fuses. These fuses provide both branch circuit protection and drive input protection. The drive input fuses are provided in series with the circuit breaker in Bulletin 2163Q units.
- Include control circuit transformer (CCT). The CCT is sized to provide power for all standard pilot devices and any required fans.
- Produce a three-phase, pulse width modulated (PWM) adjustable frequency output and voltage output for exceptional control of motor speed and torque.
- Are digitally programmable with access to mode programming, providing precise and repeatedly accurate setup, control and operation, and adaptability to handle a variety of applications.

A Human Interface Module (HIM) and Control Platform Type **must** be selected.

Bulletin 2162Q and 2163Q use PowerFlex 70 drives.

Each unit is provided as a NEMA Wiring Class I, Type A unit with terminals mounted on the drive chassis for connection of items such as, remote pilot devices and input signals. For NEMA Type 3R and NEMA Type 4 enclosure construction, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Catalog Number Explanation - Bulletin 2162Q and 2163Q PowerFlex 70 Drive

- Bulletins 2162Q and 2163Q use PowerFlex 70 drives
- NEMA Enclosure Type 1, Type 1 with gasket or Type 12 Enclosure Type
- NEMA Wiring Class I, Type A
- Isolated logic and power produces a three-phase, pulse-width-modulated (PWM) adjustable frequency output to vary motor speed

Table 177 -

2162Q	A	-	1P1N	K	B	-	33	-	14HA0
2163Q	A	-	1P1N	K	B	-	33THM	-	14HA0
Bulletin Number	Wiring Type		PowerFlex 70 Nominal Output Current Rating	NEMA Enclosure Type	Line Voltage		Nominal Horsepower/kW and Circuit Breaker Type		Human Interface Module and Options

Code	Type
2162Q	PowerFlex 70 Variable Frequency AC Drive with Fusible Disconnect
2163Q	PowerFlex 70 Variable Frequency AC Drive with Circuit Breaker

Code	Wiring Type
A	Type A

Code	NEMA Enclosure Type
K	NEMA Type 1 and Type 1 with gasket
J	NEMA Type 12

Code	Line Voltage
N	380V (1)
KN	400V (1)
I	415V (1)
B	480V
C	600V

(1) Units at these voltages are not UL or C-UL listed.

Code	Nominal Horsepower/kW Code and Circuit Breaker Type
2162Q-'33'	'33' Nominal Horsepower/kW code. See Table 266 and Table 267.
2163Q-'33THM'	'33_' Nominal Horsepower/kW code. See Table 266 and Table 267. '___THM' Circuit Breaker Type. See table on page 322

Code	Human Interface Module and Options
See options section beginning on page 285	

Drive Size Code, Output Current Rating (Amperes) and Nominal HP or (kW) (1)														
Normal Duty Applications									Heavy Duty Applications					
380...415V Line Voltage			480V Line Voltage			600V Line Voltage			480V Line Voltage			600V Line Voltage		
Code	Ratings	kW	Code	Ratings	HP	Code	Ratings	HP	Code	Ratings	HP	Code	Ratings	HP
1P3N	1.3	0.37	1P1N	1.1	0.5	0P9N	0.9	0.5	2P1H	1.1	0.5	1P7H	0.9	0.5
2P1N	1.5	0.55	2P1N	1.6	0.75	1P7N	1.3	0.75	2P1H	1.6	0.75	1P7H	1.3	0.75
2P1N	2.1	0.75	2P1N	2.1	1	1P7N	1.7	1	3P4H	2.1	1	2P7H	1.7	1
3P5N	2.6	1.1	3P4N	3.0	1.5	2P7N	2.4	1.5	3P4H	3.0	1.5	2P7H	2.4	1.5
3P5N	3.5	1.5	3P4N	3.4	2	2P7N	2.7	2	5P0H	3.4	2	3P9H	2.7	2
5P0N	5.0	2.2	5P0N	5.0	3	3P9N	3.9	3	8P0H	5.0	3	6P1H	3.9	3
8P7N	8.7	3.7	8P0N	8.0	5	6P1N	6.1	5	011H	8.0	5	9P0H	6.1	5
011N	11.5	5.5	011N	11	7.5	9P0N	9.0	7.5	014H	11	7.5	011H	9.0	7.5
015N	15.4	7.5	014N	14	10	011N	11	10	022H	14	10	017H	11	10
022N	22	11	022N	22	15	017N	17	15	027H	22	15	022H	17	15
030N	30	15	027N	27	20	022N	22	20	034H	27	20	027H	22	20
037N	37	18.5	034N	34	25	027N	27	25	040H	34	25	032H	27	25
043N	43	22	040N	40	30	032N	32	30	052H	40	30	041H	32	30
060N	60	30	052N	52	40	041N	41	40	065H	52	40	052H	41	40
072N	72	37	065N	65	50	052N	52	50						

(1) The kW and HP ratings shown are for reference only.
Size PowerFlex 70 drive units according to the applications and output ampere rating.

Units—2162Q Combination PowerFlex 70 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 380…415V (NORMAL DUTY)

- See page 199 for product description.
- Normal Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds and 150% for 3 seconds.
- For specific drive applications refer to PowerFlex 70 User Manual, publication 20A-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door and unit support pan. Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 70 drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 70 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing units with drives at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Platform Type are required. Select on page 288 and 289.
- Combination VFD units at these voltages are not UL or C-UL listed.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 70 drive units according to the application and output ampere rating.

Table 178 - Bulletin 2162Q PowerFlex 70 VFD Units (380…415V Normal Duty)

Frame	Rating (1)	Nominal kW	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
			Space Factor	Catalog Number (3)	Space Factor	Catalog Number(3)	
B	1.3	0.37	1.5	2162QA-1P3NK_-33K	2.0	2162QA-1P3NJ_-33K	PE
	1.5	0.55		2162QA-2P1NK_-34K		2162QA-2P1NJ_-34K	
	2.1	0.75		2162QA-2P1NK_-35K		2162QA-2P1NJ_-35K	
	2.6	1.1		2162QA-3P5NK_-36K		2162QA-3P5NJ_-36K	
	3.5	1.5		2162QA-3P5NK_-37K		2162QA-3P5NJ_-37K	
	5.0	2.2		2162QA-5P0NK_-38K		2162QA-5P0NJ_-38K	
	8.7	3.7		2162QA-8P7NK_-39K	2.5	2162QA-8P7NJ_-39K	
C	11.5	5.5	2.0	2162QA-011NK_-40K	3.0	2162QA-011NJ_-40K	
	15.4	7.5		2162QA-015NK_-41K		2162QA-015NJ_-41K	
D	22	11	2.5	2162QA-022NK_-42K		2162QA-022NJ_-42K	
	30	15		2162QA-030NK_-43K	3.5	2162QA-030NJ_-43K	
	37	18.5		2162QA-037NK_-44K	3.0	2162QA-037NJ_-44K	
	43	22	3.0	2162QA-043NK_-45K	3.5	2162QA-043NJ_-45K	
E	60	30	3.0(2)	2162QA-060NK_-46K	4.0	2162QA-060NJ_-46K	
	72	37	3.5	2162QA-072NK_-47K		2162QA-072NJ_-47K	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output ampere ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Requires 3.5 total space factors when door mounted pilot devices are selected.

(3) The catalog numbers listed are not complete:

- Select the appropriate voltage code: 380V = N, 400V = KN, 415 = I (for example, 2162QA-1P3NK**N**-33K).

Units—2162Q Combination PowerFlex 70 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V (NORMAL DUTY)

- See page 199 for product description.
- Normal Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds and 150% for 3 seconds.
- For specific drive applications refer to PowerFlex 70 User Manual, publication 20A-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan. Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 70 drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 70 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing units with drives at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Platform Type are required. Select on page 288 and 289.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 70 drive units according to the application and output ampere rating.

Table 179 - Bulletin 2162Q PowerFlex 70 VFD Units (480V Normal Duty)

Frame	Rating (1)	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
			Space Factor	Catalog Number	Space Factor	Catalog Number	
A	1.1	0.5	1.5	2162QA-1P1NKB-33	2.0	2162QA-1P1NJB-33	SC
	1.6	0.75		2162QA-2P1NKB-34		2162QA-2P1NJB-34	
	2.1	1		2162QA-2P1NKB-35		2162QA-2P1NJB-35	
	3.0	1.5		2162QA-3P4NKB-36		2162QA-3P4NJB-36	
	3.4	2		2162QA-3P4NKB-37		2162QA-3P4NJB-37	
B	5.0	3		2162QA-5P0NKB-38		2162QA-5P0NJB-38	
	8.0	5		2162QA-8P0NKB-39	2.5	2162QA-8P0NJB-39	
C	11	7.5	2.0	2162QA-011NKB-40	3.0	2162QA-011NJB-40	
	14	10		2162QA-014NKB-41		2162QA-014NJB-41	
D	22	15	2.5	2162QA-022NKB-42		2162QA-022NJB-42	
	27	20		2162QA-027NKB-43	3.5	2162QA-027NJB-43	
	34	25		2162QA-034NKB-44	3.0	2162QA-034NJB-44	
	40	30	3.0	2162QA-040NKB-45	3.5	2162QA-040NJB-45	
E	52	40	3.0(2)	2162QA-052NKB-46	4.0	2162QA-052NJB-46	
	65	50	3.5(3)	2162QA-065NKB-47	4.0(3)	2162QA-065NJB-47	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output ampere ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Requires 3.5 total space factors when door mounted pilot devices are selected and line or load reactor (-14RLX or -14RXL) is not selected.
Requires 4.0 total space factors when line or load reactor (-14RLX or -14RXL) is selected.

(3) Requires 6.0 total space factors, 20" wide, frame mounted (section does not have vertical wireway), when line or load reactor (-14RLX or -14RXL) is selected.
Delivery program changes to SC-II.

Units—2162Q Combination PowerFlex 70 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V (HEAVY DUTY)

- See page 199 for product description.
- Heavy Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 150% for 60 seconds and 200% for 3 seconds.
- For specific drive applications refer to PowerFlex 70 User Manual, publication 20A-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan. Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 70 drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 70 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing units with drives at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Platform Type are required. Select on page 288 and 289.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 70 drive units according to the application and output ampere rating.

Table 180 - Bulletin 2162Q PowerFlex 70 VFD Units (480V Heavy Duty)

Frame	Rating (1)	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
			Space Factor	Catalog Number	Space Factor	Catalog Number	
A	1.1	0.5	1.5	2162QA-2P1HKB-33	2.0	2162QA-2P1HJB-33	SC
	1.6	0.75		2162QA-2P1HKB-34		2162QA-2P1HJB-34	
	2.1	1		2162QA-3P4HKB-35		2162QA-3P4HJB-35	
	3.0	1.5		2162QA-3P4HKB-36		2162QA-3P4HJB-36	
B	3.4	2		2162QA-5P0HKB-37		2162QA-5P0HJB-37	
	5.0	3		2162QA-8P0HKB-38	2.5	2162QA-8P0HJB-38	
C	8.0	5	2.0	2162QA-011HKB-39	3.0	2162QA-011HJB-39	
	11	7.5		2162QA-014HKB-40		2162QA-014HJB-40	
D	14	10	2.5	2162QA-022HKB-41		2162QA-022HJB-41	
	22	15		2162QA-027HKB-42	3.5	2162QA-027HJB-42	
	27	20		2162QA-034HKB-43	3.0	2162QA-034HJB-43	
	34	25	3.0	2162QA-040HKB-44	3.5	2162QA-040HJB-44	
E	40	30	3.0(2)	2162QA-052HKB-45	4.0	2162QA-052HJB-45	
	52	40	3.5(3)	2162QA-065HKB-46	4.0(3)	2162QA-065HJB-46	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output ampere ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Requires 3.5 total space factors when door mounted pilot devices are selected and line or load reactor (-14RLX or -14RXL) is not selected.
Requires 4.0 total space factors when line or load reactor (-14RLX or -14RXL) is selected.

(3) Requires 6.0 total space factors, 20" wide, frame mounted (section does not have vertical wireway), when line or load reactor (-14RLX or -14RXL) is selected.
Delivery program changes to SC-II.

Units—2162Q Combination PowerFlex 70 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 600V (NORMAL DUTY)

- See page 199 for product description.
- Normal Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds and 150% for 3 seconds.
- For specific drive applications refer to PowerFlex 70 User Manual, publication 20A-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan. Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 70 drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 70 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing units with drives at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Platform Type are required. Select on page 288 and 289.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 70 drive units according to the application and output ampere rating.

Table 181 - Bulletin 2162Q PowerFlex 70 VFD Units (600V Normal Duty)

Frame	Rating (1)	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
			Space Factor	Catalog Number	Space Factor	Catalog Number	
A	0.9	0.5	1.5	2162QA-0P9NKC-33	2.0	2162QA-0P9NJC-33	SC
	1.3	0.75		2162QA-1P7NKC-34		2162QA-1P7NJC-34	
	1.7	1		2162QA-1P7NKC-35		2162QA-1P7NJC-35	
	2.4	1.5		2162QA-2P7NKC-36		2162QA-2P7NJC-36	
	2.7	2		2162QA-2P7NKC-37		2162QA-2P7NJC-37	
B	3.9	3		2162QA-3P9NKC-38		2162QA-3P9NJC-38	
	6.1	5		2162QA-6P1NKC-39	2.5	2162QA-6P1NJC-39	
C	9.0	7.5	2.0	2162QA-9P0NKC-40	3.0	2162QA-9P0NJC-40	
	11	10		2162QA-011NKC-41		2162QA-011NJC-41	
D	17	15	2.5	2162QA-017NKC-42		2162QA-017NJC-42	
	22	20		2162QA-022NKC-43	3.5	2162QA-022NJC-43	
	27	25		2162QA-027NKC-44	3.0	2162QA-027NJC-44	
	32	30		2162QA-032NKC-45		2162QA-032NJC-45	
E	41	40	3.0 (2)	2162QA-041NKC-46	4.0	2162QA-041NJC-46	
	52	50		2162QA-052NKC-47		2162QA-052NJC-47	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output ampere ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Requires 3.5 total space factors when door mounted pilot devices are selected and line or load reactor (-14RLX or -14RXL) is not selected.
Requires 4.0 total space factors when line or load reactor (-14RLX or -14RXL) is selected.

Units—2162Q Combination PowerFlex 70 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 600V (HEAVY DUTY)

- See page 199 for product description.
- Heavy Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 150% for 60 seconds and 200% for 3 seconds.
- For specific drive applications refer to PowerFlex 70 User Manual, publication 20A-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan. Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 70 drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 70 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing units with drives at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Platform Type are required. Select on page 288 and 289.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 70 drive units according to the application and output ampere rating.

Table 182 - Bulletin 2162Q PowerFlex 70 VFD Units (600V Heavy Duty)

Frame	Rating (1)	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
			Space Factor	Catalog Number	Space Factor	Catalog Number	
A	0.9	0.5	1.5	2162QA-1P7HKC-33	2.0	2162QA-1P7HJC-33	SC
	1.3	0.75		2162QA-1P7HKC-34		2162QA-1P7HJC-34	
	1.7	1		2162QA-2P7HKC-35		2162QA-2P7HJC-35	
	2.4	1.5		2162QA-2P7HKC-36		2162QA-2P7HJC-36	
B	2.7	2		2162QA-3P9HKC-37		2162QA-3P9HJC-37	
	3.9	3		2162QA-6P1HKC-38	2.5	2162QA-6P1HJC-38	
C	6.1	5	2.0	2162QA-9P0HKC-39	3.0	2162QA-9P0HJC-39	
	9.0	7.5		2162QA-011HKC-40		2162QA-011HJC-40	
D	11	10	2.5	2162QA-017HKC-41		2162QA-017HJC-41	
	17	15		2162QA-022HKC-42	3.5	2162QA-022HJC-42	
	22	20		2162QA-027HKC-43	3.0	2162QA-027HJC-43	
	27	25		2162QA-032HKC-44		2162QA-032HJC-44	
E	32	30	3.0 (2)	2162QA-041HKC-45	4.0	2162QA-041HJC-45	
	41	40		2162QA-052HKC-46		2162QA-052HJC-46	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output ampere ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Requires 3.5 total space factors when door mounted pilot devices are selected and line or load reactor (-14RLX or -14RXL) is not selected.
Requires 4.0 total space factors when line or load reactor (-14RLX or -14RXL) is selected.

Units—2163Q Combination PowerFlex 70 Variable Frequency AC Drive (VFD) Units with Circuit Breaker Disconnect, 380…415V (NORMAL DUTY)

- See page 199 for product description.
- Normal Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds and 150% for 3 seconds.
- For specific drive applications refer to PowerFlex 70 User Manual, publication 20A-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan. Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 70 drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 70 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing units with drives at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Platform Type are required. Select on page 288 and 289.
- Combination VFD units at these voltages are not UL or C-UL listed.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 70 drive units according to the application and output ampere rating.

Table 183 - Bulletin 2163Q PowerFlex 70 VFD Units (380…415V Normal Duty)

Frame	Rating (1)	Nominal kW	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
			Space Factor	Catalog Number(3)	Space Factor	Catalog Number	
B	1.3	0.37	1.5	2163QA-1P3NK_-33K_	2.0	2163QA-1P3NJ_-33K_	PE
	1.5	0.55		2163QA-2P1NK_-34K_		2163QA-2P1NJ_-34K_	
	2.1	0.75		2163QA-2P1NK_-35K_		2163QA-2P1NJ_-35K_	
	2.6	1.1		2163QA-3P5NK_-36K_		2163QA-3P5NJ_-36K_	
	3.5	1.5		2163QA-3P5NK_-37K_		2163QA-3P5NJ_-37K_	
	5.0	2.2		2163QA-5P0NK_-38K_		2163QA-5P0NJ_-38K_	
	8.7	3.7		2163QA-8P7NK_-39K_	2.5	2163QA-8P7NJ_-39K_	
C	11.5	5.5	2.0	2163QA-011NK_-40K_	3.0	2163QA-011NJ_-40K_	
	15.4	7.5		2163QA-015NK_-41K_		2163QA-015NJ_-41K_	
D	22	11	2.5	2163QA-022NK_-42K_		2163QA-022NJ_-42K_	
	30	15		2163QA-030NK_-43K_	3.5	2163QA-030NJ_-43K_	
	37	18.5		2163QA-037NK_-44K_	3.0	2163QA-037NJ_-44K_	
	43	22	3.0	2163QA-043NK_-45K_	3.5	2163QA-043NJ_-45K_	
E	60	30	3.0 (2)	2163QA-060NK_-46K_	4.0(2)	2163QA-060NJ_-46K_	
	72	37	4.0	2163QA-072NK_-47K_	4.0	2163QA-072NJ_-47K_	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output ampere ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Requires 3.5 total space factors when door mounted pilot devices are selected.

(3) The catalog numbers listed are not complete:
- Select the appropriate voltage code: 380V = N, 400V = KN, 415 = I (for example, 2163QA-1P3NK**N**-33K).
- Select the appropriate suffix code from the circuit breaker table on page 322 to identify the desired circuit breaker type (for example, 2163QA-1P3NKN-33K**THM**).

Units—2163Q Combination PowerFlex 70 Variable Frequency AC Drive (VFD) Units with Circuit Breaker Disconnect, 480V (NORMAL DUTY)

- See page 199 for product description.
- Normal Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds and 150% for 3 seconds.
- For specific drive applications refer to PowerFlex 70 User Manual, publication 20A-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan. Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 70 drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 70 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing units with drives at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Platform Type are required. Select on page 288 and 289.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 70 drive units according to the application and output ampere rating.

Table 184 - Bulletin 2163Q PowerFlex 70 VFD Units (480V Normal Duty)

Frame	Rating (1)	Nominal HP	NEMA Type 1 and Type 1 w/ gasket	Catalog Number (3)	NEMA Type 12	Catalog Number(3)	Delivery Program
			Space Factor		Space Factor		
A	1.1	0.5	1.5	2163QA-1P1NKB-33_	2.0	2163QA-1P1NJB-33_	SC
	1.6	0.75		2163QA-2P1NKB-34_			
	2.1	1		2163QA-2P1NJB-34_			
	3.0	1.5		2163QA-2P1NJB-35_		2163QA-3P4NJB-36_	
	3.4	2		2163QA-3P4NKB-37_		2163QA-3P4NJB-37_	
B	5.0	3		2163QA-5P0NKB-38_		2163QA-5P0NJB-38_	
	8.0	5		2163QA-8P0NKB-39_	2.5	2163QA-8P0NJB-39_	
C	11	7.5	2.0	2163QA-011NKB-40_	3.0	2163QA-011NJB-40_	
	14	10		2163QA-014NKB-41_		2163QA-014NJB-41_	
D	22	15	2.5	2163QA-022NKB-42_		2163QA-022NJB-42_	
	27	20		2163QA-027NKB-43_	3.5	2163QA-027NJB-43_	
	34	25		2163QA-034NKB-44_	3.0	2163QA-034NJB-44_	
	40	30	3.0	2163QA-040NKB-45_	3.5	2163QA-040NJB-45_	
E	52	40	3.0(2)	2163QA-052NKB-46_	4.0	2163QA-052NJB-46_	
	65	50	3.5(4)	2163QA-065NKB-47_	4.0(4)	2163QA-065NJB-47_	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output ampere ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Requires 3.5 total space factors when door mounted pilot devices are selected and line or load reactor (-14RLX or -14RXL) is not selected.
Requires 4.0 total space factors when line or load reactor (-14RLX or -14RXL) is selected.

(3) The catalog numbers listed are not complete. Select the appropriate suffix code from the Circuit Breaker table on page 322 to identify the desired circuit breaker type (for example, 2163QA-1P1NKB-33**THM**).

(4) Requires 6.0 total space factors, 20" wide, frame mounted (section does not have vertical wireway), when line or load reactor (-14RLX or -14RXL) is selected. Delivery program changes to SC-II.

Units—2163Q Combination PowerFlex 70 Variable Frequency AC Drive (VFD) Units with Circuit Breaker Disconnect, 480V (HEAVY DUTY)

- See page 199 for product description.
- Heavy Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 150% for 60 seconds and 200% for 3 seconds.
- For specific drive applications refer to PowerFlex 70 User Manual, publication 20A-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan. Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 70 drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 70 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing units with drives at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Platform Type are required. Select on page 288 and 289.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 70 drive units according to the application and output ampere rating.

Table 185 - Bulletin 2163Q PowerFlex 70 VFD Units (480V Heavy Duty)

Frame	Rating (1)	Nominal HP	NEMA Type 1 and Type 1 w/gasket	Catalog Number (3)	NEMA Type 12	Catalog Number	Delivery Program
			Space Factor		Space Factor		
A	1.1	0.5	1.5	2163QA-2P1HKB-33_	2.0	2163QA-2P1HJB-33_	SC
	1.6	0.75		2163QA-2P1HKB-34_		2163QA-2P1HJB-34_	
	2.1	1		2163QA-3P4HKB-35_		2163QA-3P4HJB-35_	
	3.0	1.5		2163QA-3P4HKB-36_		2163QA-3P4HJB-36_	
B	3.4	2		2163QA-5P0HKB-37_		2163QA-5P0HJB-37_	
	5	3		2163QA-8P0HKB-38_	2.5	2163QA-8P0HJB-38_	
C	8	5	2.0	2163QA-011HKB-39_	3.0	2163QA-011HJB-39_	
	11	7.5		2163QA-014HKB-40_		2163QA-014HJB-40_	
D	14	10	2.5	2163QA-022HKB-41_		2163QA-022HJB-41_	
	22	15		2163QA-027HKB-42_	3.5	2163QA-027HJB-42_	
	27	20		2163QA-034HKB-43_	3.0	2163QA-034HJB-43_	
	34	25	3.0	2163QA-040HKB-44_	3.5	2163QA-040HJB-44_	

Table continued on the next page.

Table 185 - Bulletin 2163Q PowerFlex 70 VFD Units (480V Heavy Duty)

Frame	Rating (1)	Nominal HP	NEMA Type 1 and Type 1 w/gasket	Catalog Number (3)	NEMA Type 12	Catalog Number	Delivery Program
			Space Factor		Space Factor		
E	40	30	3.0(2)	2163QA-052HKB-45_	4.0	2163QA-052HJB-45_	SC
	52	40	3.5(4)	2163QA-065HKB-46_	4.0(4)	2163QA-065HJB-46_	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output ampere ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Requires 3.5 total space factors when door mounted pilot devices are selected and line or load reactor (-14RLX or -14RXL) is not selected.
Requires 4.0 total space factors when line or load reactor (-14RLX or -14RXL) is selected.

(3) The catalog numbers listed are not complete:
Select the appropriate suffix code from the Circuit Breaker Table on page 322 to identify the desired circuit breaker type (for example,2163QA-1P1NKB-33**THM**).

(4) Requires 6.0 total space factors, 20″ wide, frame mounted (section does not have vertical wireway), when line or load reactor (-14RLX or -14RXL) is selected. Delivery program changes to SC-II.

Units—2163Q Combination PowerFlex 70 Variable Frequency AC Drive (VFD) Units with Circuit Breaker Disconnect, 600V (NORMAL DUTY)

- See page 199 for product description.
- Normal Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds and 150% for 3 seconds.
- For specific drive applications refer to PowerFlex 70 User Manual, publication 20A-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan. Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 70 drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 70 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can only accept 16 AWG control wire.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing units with drives at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Platform Type are required. Select on page 288 and 289.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 70 drive units according to the application and output ampere rating.

Table 186 - Bulletin 2163Q PowerFlex 70 VFD Units (600V Normal Duty)

Frame	Rating [1]	Nominal HP	NEMA Type 1 and Type 1 w/gasket	Catalog Number [3]	NEMA Type 12	Catalog Number [3]	Delivery Program
			Space Factor		Space Factor		
A	0.9	0.5	1.5	2163QA-0P9NKC-33_	2.0	2163QA-0P9NJC-33_	SC
	1.3	0.75		2163QA-1P7NKC-34_		2163QA-1P7NJC-34_	
	1.7	1		2163QA-1P7NKC-35_		2163QA-1P7NJC-35_	
	2.4	1.5		2163QA-2P7NKC-36_		2163QA-2P7NJC-36_	
	2.7	2		2163QA-2P7NKC-37_		2163QA-2P7NJC-37_	
B	3.9	3		2163QA-3P9NKC-38_		2163QA-3P9NJC-38_	
	6.1	5		2163QA-6P1NKC-39_	2.5	2163QA-6P1NJC-39_	
C	9.0	7.5	2.0	2163QA-9P0NKC-40_	3.0	2163QA-9P0NJC-40_	
	11	10		2163QA-011NKC-41_		2163QA-011NJC-41_	
D	17	15	2.5	2163QA-017NKC-42_		2163QA-017NJC-42_	
	22	20		2163QA-022NKC-43_	3.5	2163QA-022NJC-43_	
	27	25		2163QA-027NKC-44_	3.0	2163QA-027NJC-44_	
	32	30		2163QA-032NKC-45_		2163QA-032NJC-45_	
E	41	40	3.0 [2]	2163QA-041NKC-46_	4.0	2163QA-041NJC-46_	
	52	50		2163QA-052NKC-47_		2163QA-052NJC-47_	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output ampere ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Requires 3.5 total space factors when door mounted pilot devices are selected and line or load reactor (-14RLX or -14RXL) is not selected.
Requires 4.0 total space factors when line or load reactor (-14RLX or -14RXL) is selected.

(3) The catalog number is not complete:
- Select the appropriate suffix code from the Circuit Breaker Table on page 322 to identify the desired circuit breaker type (for example, 2163QA-0P9NKC-33**THM**).

Units—2163Q Combination PowerFlex 70 Variable Frequency AC Drive (VFD) Units with Circuit Breaker Disconnect, 600V (HEAVY DUTY)

- See page 199 for product description.
- Heavy Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 150% for 60 seconds and 200% for 3 seconds.
- For specific drive applications refer to PowerFlex 70 User Manual, publication 20A-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan. Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 70 drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 70 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing units with drives at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Platform Type are required. Select on page 288 and 289.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 70 drive units according to the application and output ampere rating.

Table 187 - Bulletin 2163Q PowerFlex VFD Units (600V Heavy Duty)

Frame	Rating (1)	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
			Space Factor	Catalog Number (3)	Space Factor	Catalog Number (3)	
A	0.9	0.5	1.5	2163QA-1P7HKC-33_	2.0	2163QA-1P7HJC-33_	SC
	1.3	0.75		2163QA-1P7HKC-34_		2163QA-1P7HJC-34_	
	1.7	1		2163QA-2P7HKC-35_		2163QA-2P7HJC-35_	
	2.4	1.5		2163QA-2P7HKC-36_		2163QA-2P7HJC-36_	
B	2.7	2		2163QA-3P9HKC-37_		2163QA-3P9HJC-37_	
	3.9	3		2163QA-6P1HKC-38_	2.5	2163QA-6P1HJC-38_	
C	6.1	5	2.0	2163QA-9P0HKC-39_	3.0	2163QA-9P0HJC-39_	
	9	7.5		2163QA-011HKC-40_		2163QA-011HJC-40_	
D	11	10	2.5	2163QA-017HKC-41_		2163QA-017HJC-41_	
	17	15		2163QA-022HKC-42_	3.5	2163QA-022HJC-42_	
	22	20		2163QA-027HKC-43_	3.0	2163QA-027HJC-43_	
	27	25		2163QA-032HKC-44_		2163QA-032HJC-44_	
E	32	30	3.0 (2)	2163QA-041HKC-45_	4.0	2163QA-041HJC-45_	
	41	40		2163QA-052HKC-46_		2163QA-052HJC-46_	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output ampere ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Requires 3.5 total space factors when door mounted pilot devices are selected and line or load reactor (-14RLX or -14RXL) is not selected.
Requires 4.0 total space factors when line or load reactor (-14RLX or -14RXL) is selected.

(3) The catalog number is not complete:
- Select the appropriate suffix code from the Circuit Breaker Table on page 322 to identify the desired circuit breaker type (for example, 2163QA-0P9HKC-33**THM**).

Bulletin 2162R and 2163R with PowerFlex 700 Drive

These combination variable frequency AC motor drive units are specifically designed for use in CENTERLINE motor control centers. Each unit contains a high performance, microprocessor-controlled, variable frequency AC drive and either a fusible disconnect switch or a circuit breaker.

They also:

- Include isolated logic and power.
- Include fans and venting where required. See page 362.
- Include internal electronic overload protection.
- Include EMC filters on 380…415V AC.
- Include UL Class J time delay fuses. These fuses provide both branch circuit protection and drive input protection. The drive input fuses are provided in series with the circuit breaker in Bulletin 2163R units.
- Include control circuit transformer (CCT). The CCT is sized to provide power for all standard pilot devices and any required fan(s).
- Produce a three-phase, pulse width modulated (PWM) adjustable frequency output and voltage output for exceptional control of motor speed and torque.
- Are digitally programmable with access to mode programming, providing precise and repeatedly accurate set-up, control and operation, and adaptability to handle a variety of applications.
- Have available 24V DC or 115V AC control voltages.
- A Human Interface Module (HIM) and Control Interface Type **must** be selected.
- Bulletin 2162R and 2163R use PowerFlex 700 drives.

Each unit is provided as a NEMA Wiring Class I, Type A unit with terminals mounted on the drive chassis for connection of items such as, remote pilot devices and input signals. For NEMA Type 3R and NEMA Type 4 enclosure construction, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Catalog Number Explanation - Bulletin 2162R and 2163R PowerFlex 700 Drive

- Bulletins 2162R and 2163R use PowerFlex 700 Drives
- NEMA Enclosure Type 1, Type 1 with gasket or Type 12 Enclosure Type
- Class J time delay drive input fuses provide both branch circuit and drive input protection
- Isolated logic and power produces a three-phase, pulse-width-modulated (PWM) adjustable frequency output to vary motor speed

Table 188 -

2162R	A	-	034N	K	B	-	44	-	14HA0
2163R	A	-	034N	K	B	-	44THM	-	14HA0
Bulletin Number	Wiring Type		PowerFlex 700 Nominal Output Current Rating	NEMA Enclosure Type	Line Voltage		Nominal Horsepower/kW and Circuit Breaker Type		Human Interface Module and Options

Code	Type
2162R	PowerFlex 700 Variable Frequency AC Drive with Fusible Disconnect
2163R	PowerFlex 700 Variable Frequency AC Drive with Circuit Breaker

Code	Wiring Type
A	Type A

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Line Voltage
N	380V (1)
KN	400V (1)
I	415V (1)
B	480V
C	600V

(1) Units at these voltages are not UL or C-UL listed.

Code	Nominal Horsepower/kW Code and Circuit Breaker Type
2162R-'33'	'33_' Nominal Horsepower/kW code. See Table 266 and Table 267.
2163R-'33THM'	'33' Nominal Horsepower/kW code. See Table 266 and Table 267. '___THM' Circuit Breaker Type. See table on page 322

Code	Human Interface Module and Options
See options section beginning on page 285	

Drive Size Code, Output Current Rating (Amperes) and Nominal HP or (kw) (1)															
Normal Duty Applications										Heavy Duty Applications					
380...415V Line Voltage			480V Line Voltage			600V Line Voltage				480V Line Voltage			600V Line Voltage		
Code	Ratings	kW	Code	Ratings	HP	Code	Ratings	HP		Code	Ratings	HP	Code	Ratings	HP
1P3N	1.3	0.37	1P1N	1.1	0.5	1P7N	1.7	1		2P1H	1.1	0.5	2P7H	1.7	1
2P1N	1.5	0.55	2P1N	1.6	0.75	2P7N	2.4	1.5		2P1H	1.6	0.75	2P7H	2.4	1.5
2P1N	2.1	0.75	2P1N	2.1	1	2P7N	2.7	2		3P4H	2.1	1	3P9H	2.7	2
3P5N	2.6	1.1	3P4N	3.0	1.5	3P9N	3.9	3		3P4H	3.0	1.5	6P1H	3.9	3
3P5N	3.5	1.5	3P4N	3.4	2	6P1N	6.1	5		5P0H	3.4	2	9P0H	6.1	5
5P0N	5.0	2.2	5P0N	5.0	3	9P0N	9.0	7.5		8P0H	5.0	3	011H	9.0	7.5
8P7N	8.7	3.7	8P0N	8.0	5	011N	11	10		011H	8.0	5	017H	11	10
011N	11.5	5.5	011N	11	7.5	017N	17	15		014H	11	7.5	022H	17	15
015N	15.4	7.5	014N	14	10	022N	22	20		022H	14	10	027H	22	20
022N	22	11	022N	22	15	027N	27	25		027H	22	15	032H	27	25
030N	30	15	027N	27	20	032N	32	30		034H	27	20	041H	32	30
037N	37	18.5	034N	34	25	041N	41	40		040H	34	25	052H	41	40
043N	43	22	040N	40	30	052N	52	50		052H	40	30	062H	52	50
056N	56	30	052N	52	40	062N	62	60		065H	52	40	077H	62	60
072N	72	37	065N	65	50	077N	77	75		077H	65	50	125H	77	75
105N	85	45	077N	77	60	125N	99	100		096H	77	60	125H	99	100
105N	105	55	096N	96	75	125N	125	125		125H	96	75	144H	125	125
170N	138	75	125N	125	100	144N	144	150		156H	125	100			
170N	170	90	156N	156	125					180H	156	125			
300N	205	110	180N	180	150					300H	180	150			
300N	255	132	300N	255	200					300H	245	200			

(1) The kW and HP ratings shown are for reference only.
Size PowerFlex 700 drive units according to the applications and output ampere rating.

Units—2162R Combination PowerFlex 700 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 380…415V AC (NORMAL DUTY)

- See page 215 for product description.
- Normal Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds and 150% for 3 seconds.
- For specific drive applications refer to the PowerFlex 700 User Manual, publication 20B-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan.
  Branch circuit (overload) protection is provided by the internal drive overload.
- PowerFlex700 AC drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 700 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive. Give strong consideration to placing units with drives at the bottom of the section. When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Interface Type are required. Select on page 288 and 289.
- Combination VFD units at these voltages are not UL or C-UL listed.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 700 drive units according to the application and output ampere rating.

Table 189 - Bulletin 2162R PowerFlex 700 VFD Units (380…415V Normal Duty)

Frame	Rating (1)	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
	Normal Duty	380…415V	Space Factor	Catalog Number(3)	Space Factor	Catalog Number	
0	1.3	0.37	2.0	2162RA-1P3NK_-33K	2.0	2162RA-1P3NJ_-33K	PE
	1.5	0.55		2162RA-2P1NK_-34K		2162RA-2P1NJ_-34K	
	2.1	0.75		2162RA-2P1NK_-35K		2162RA-2P1NJ_-35K	
	2.6	1.1		2162RA-3P5NK_-36K		2162RA-3P5NJ_-36K	
	3.5	1.5		2162RA-3P5NK_-37K		2162RA-3P5NJ_-37K	
	5.0	2.2		2162RA-5P0NK_-38K		2162RA-5P0NJ_-38K	
	8.7	3.7		2162RA-8P7NK_-39K	2.5	2162RA-8P7NJ_-39K	
	11.5	5.5		2162RA-011NK_-40K		2162RA-011NJ_-40K	
1	15.4	7.5		2162RA-015NK_-41K		2162RA-015NJ_-41K	
	22	11		2162RA-022NK_-42K	3.0	2162RA-022NJ_-42K	
2	30	15	2.5	2162RA-030NK_-43K		2162RA-030NJ_-43K	
	37	18.5		2162RA-037NK_-44K		2162RA-037NJ_-44K	
3	43	22	3.0	2162RA-043NK_-45K	3.5	2162RA-043NJ_-45K	
	56	30		2162RA-056NK_-46K	4.0	2162RA-056NJ_-46K	
	72	37		2162RA-072NK_-47K		2162RA-072NJ_-47K	
5	85	45	6.0, 25”W, 20”D(2)	2162RA-105NK_-48K	6.0, 25”W, 20”D(2)	2162RA-105NJ_-48K	PE-II
	105	55		2162RA-105NK_-49K		2162RA-105NJ_-49K	
6	138	75		2162RA-170NK_-50K	6.0 30”W, 20”D(2)	2162RA-170NJ_-50K	
	170	90		2162RA-170NK_-51K		2162RA-170NJ_-51K	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output current ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5” deeper than standard.

(3) The catalog numbers listed are not complete:
Select the appropriate voltage code (380V = N, 400V = KN, 415V = I) (for example, 2162RA-1P3NK**N**-33K).

Units—2162R Combination PowerFlex 700 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V AC (NORMAL DUTY)

- See page 215 for product description.
- Normal Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds and 150% for 3 seconds.
- For specific drive applications refer to the PowerFlex 700 User Manual, publication 20B-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan.
  Branch circuit (overload) protection is provided by the internal drive overload.
- PowerFlex700 AC drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 700 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive. Give strong consideration to placing units with drives at the bottom of the section. When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Interface Type are required. Select on page 288 and 289.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 700 drive units according to the application and output ampere rating.

Table 190 - Bulletin 2162R PowerFlex 700 VFD Units (480V Normal Duty)

Frame	Rating (1)	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
	Normal Duty	480V	Space Factor	Catalog Number	Space Factor	Catalog Number	
0	1.1	0.5	2.0	2162RA-1P1NKB-33	2.0	2162RA-1P1NJB-33	SC
	1.6	0.75		2162RA-2P1NKB-34		2162RA-2P1NJB-34	
	2.1	1		2162RA-2P1NKB-35		2162RA-2P1NJB-35	
	3.0	1.5		2162RA-3P4NKB-36		2162RA-3P4NJB-36	
	3.4	2		2162RA-3P4NKB-37		2162RA-3P4NJB-37	
	5.0	3		2162RA-5P0NKB-38		2162RA-5P0NJB-38	
	8.0	5		2162RA-8P0NKB-39	2.5	2162RA-8P0NJB-39	
	11	7.5		2162RA-011NKB-40		2162RA-011NJB-40	
1	14	10		2162RA-014NKB-41		2162RA-014NJB-41	
	22	15		2162RA-022NKB-42	3.0	2162RA-022NJB-42	
2	27	20	2.5	2162RA-027NKB-43		2162RA-027NJB-43	
	34	25		2162RA-034NKB-44		2162RA-034NJB-44	
3	40	30	3.0	2162RA-040NKB-45	3.5	2162RA-040NJB-45	
	52	40		2162RA-052NKB-46	4.0	2162RA-052NJB-46	
	65	50		2162RA-065NKB-47		2162RA-065NJB-47	
4	77	60	6.0, 20″ W(2)	2162RA-077NKB-48	6.0, 25″ W(2)	2162RA-077NJB-48	SC-II
5	96	75	6.0 25″W, 20″D(3)	2162RA-096NKB-49	6.0 25″W, 20″D(3)	2162RA-096NJB-49	
	125	100		2162RA-125NKB-50		2162RA-125NJB-50	
6	156	125		2162RA-156NKB-51	6.0 30″W, 20″D(3)	2162RA-156NJB-51	
	180	150		2162RA-180NKB-52	6.0 35″W, 20″D(3)	2162RA-180NJB-52	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output current ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Frame mounted unit, section does not have vertical wireway.

(3) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5″ deeper than standard.

Units—2162R Combination PowerFlex 700 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V AC (HEAVY DUTY)

- See page 215 for product description.
- Heavy Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 150% for 60 seconds and 200% for 3 seconds.
- For specific drive applications refer to the PowerFlex 700 User Manual, publication 20B-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan.
  Branch circuit (overload) protection is provided by the internal drive overload.
- PowerFlex 700 drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 700 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing units with drives at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Interface Type are required. Select on page 288 and 289.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 700 drive units according to the application and output ampere rating.

Table 191 - Bulletin 2162R PowerFlex 700 VFD Units (480V Heavy Duty)

Frame	Rating (1)	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
	Heavy Duty	480V	Space Factor	Catalog Number	Space Factor	Catalog Number	
0	1.1	0.5	2.0	2162RA-2P1HKB-33	2.0	2162RA-2P1HJB-33	SC
	1.6	0.75		2162RA-2P1HKB-34		2162RA-2P1HJB-34	
	2.1	1		2162RA-3P4HKB-35		2162RA-3P4HJB-35	
	3.0	1.5		2162RA-3P4HKB-36		2162RA-3P4HJB-36	
	3.4	2		2162RA-5P0HKB-37		2162RA-5P0HJB-37	
	5.0	3		2162RA-8P0HKB-38	2.5	2162RA-8P0HJB-38	
	8.0	5		2162RA-011HKB-39		2162RA-011HJB-39	
1	11	7.5		2162RA-014HKB-40		2162RA-014HJB-40	
	14	10		2162RA-022HKB-41	3.0	2162RA-022HJB-41	
2	22	15	2.5	2162RA-027HKB-42		2162RA-027HJB-42	
	27	20		2162RA-034HKB-43		2162RA-034HJB-43	
3	34	25	3.0	2162RA-040HKB-44	3.5	2162RA-040HJB-44	
	40	30		2162RA-052HKB-45	4.0	2162RA-052HJB-45	
	52	40		2162RA-065HKB-46		2162RA-065HJB-46	
4	65	50	6.0, 20"W(2)	2162RA-077HKB-47	6.0, 25" W(3)	2162RA-077HJB-47	SC-II
5	77	60	6.0 25"W, 20"D(3)	2162RA-096HKB-48	6.0 25"W, 20"D(3)	2162RA-096HJB-48	
	96	75		2162RA-125HKB-49		2162RA-125HJB-49	
6	125	100		2162RA-156HKB-50	6.0 30"W, 20"D(3)	2162RA-156HJB-50	
	156	125		2162RA-180HKB-51	6.0 35"W, 20"D(3)	2162RA-180HJB-51	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output current ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Frame mounted unit, section does not have vertical wireway.

(3) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5" deeper than standard.

Units—2162R Combination PowerFlex 700 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 600V AC (NORMAL DUTY)

- See page 215 for product description.
- Normal Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds and 150% for 3 seconds.
- For specific drive applications refer to the PowerFlex 700 User Manual, publication 20B-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan.
  Branch circuit (overload) protection is provided by the internal drive overload.
- PowerFlex700 AC drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 700 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive. Give strong consideration to placing units with drives at the bottom of the section. When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Interface Type are required. Select on page 288 and 289.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 700 drive units according to the application and output ampere rating.

Table 192 - Bulletin 2162R PowerFlex 700 VFD Units (600V Normal Duty)

Frame	Rating	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
	Normal Duty	600V	Space Factor	Catalog Number	Space Factor	Catalog Number	
0	1.7 (1)	1	2.0	2162RA-1P7NKC-35	2.0	2162RA-1P7NJC-35	PE
	2.4 (1)	1.5		2162RA-2P7NKC-36		2162RA-2P7NJC-36	
	2.7 (1)	2		2162RA-2P7NKC-37		2162RA-2P7NJC-37	
	3.9 (1)	3		2162RA-3P9NKC-38		2162RA-3P9NJC-38	
	6.1 (1)	5		2162RA-6P1NKC-39	2.5	2162RA-6P1NJC-39	
	9.0 (1)	7.5		2162RA-9P0NKC-40		2162RA-9P0NJC-40	
1	11 (1)	10		2162RA-011NKC-41		2162RA-011NJC-41	
	17 (1)	15		2162RA-017NKC-42	3.0	2162RA-017NJC-42	
2	22 (1)	20	2.5	2162RA-022NKC-43		2162RA-022NJC-43	
	27 (1)	25		2162RA-027NKC-44		2162RA-027NJC-44	
3	32 (1)	30	3.0	2162RA-032NKC-45	3.5	2162RA-032NJC-45	
	41 (1)	40		2162RA-041NKC-46	4.0	2162RA-041NJC-46	
	52 (1)	50		2162RA-052NKC-47		2162RA-052NJC-47	
4	62 (2)	60	6.0, 20″W(3)	2162RA-062NKC-48	6.0, 25″W(3)	2162RA-062NJC-48	
5	77 (2)	75	6.0, 25″W, 20″D (4)	2162RA-077NKC-49	6.0, 25″W, 20″D (4)	2162RA-077NJC-49	
6	99 (2)	100		2162RA-125NKC-50	6.0, 30″W, 20″D (4)	2162RA-125NJC-50	
	125 (2)	125		2162RA-125NKC-51		2162RA-125NJC-51	
	144 (2)	150		2162RA-144NKC-52	6.0, 35″W, 20″D (4)	2162RA-144NJC-52	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output current ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Ampere ratings are at 2 kHz carrier frequency. If carrier frequencies above 2 kHz are selected, the drive output current ratings **can** require derating. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative and to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(3) Frame mounted unit, section does not have vertical wireway.

(4) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5″ deeper than standard.

Units—2162R Combination PowerFlex 700 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 600V AC (HEAVY DUTY)

- See page 215 for product description.
- Heavy Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 150% for 60 seconds and 200% for 3 seconds.
- For specific drive applications refer to the PowerFlex 700 User Manual, publication 20B-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan.
  Branch circuit (overload) protection is provided by the internal drive overload.
- PowerFlex 700 drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 700 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing units with drives at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Interface Type are required. Select on page 288 and 289.

IMPORTANT The HP ratings shown below are for reference only. Size PowerFlex 700 drive units according to the application and output ampere rating.

Table 193 - Bulletin 2162R PowerFlex 700 VFD Units (600V Heavy Duty)

Frame	Rating	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
	Heavy Duty	600V	Space Factor	Catalog Number	Space Factor	Catalog Number	
0	1.7 (1)	1	2.0	2162RA-2P7HKC-35	2.0	2162RA-2P7HJC-35	PE
	2.4 (1)	1.5		2162RA-2P7HKC-36		2162RA-2P7HJC-36	
	2.7 (1)	2		2162RA-3P9HKC-37		2162RA-3P9HJC-37	
	3.9 (1)	3		2162RA-6P1HKC-38	2.5	2162RA-6P1HJC-38	
	6.1 (1)	5		2162RA-9P0HKC-39		2162RA-9P0HJC-39	
1	9.0 (1)	7.5		2162RA-011HKC-40		2162RA-011HJC-40	
	11 (1)	10		2162RA-017HKC-41	3.0	2162RA-017HJC-41	
2	17 (1)	15	2.5	2162RA-022HKC-42		2162RA-022HJC-42	
	22 (1)	20		2162RA-027HKC-43		2162RA-027HJC-43	
3	27 (1)	25	3.0	2162RA-032HKC-44	3.5	2162RA-032HJC-44	
	32 (1)	30		2162RA-041HKC-45	4.0	2162RA-041HJC-45	
	41 (1)	40		2162RA-052HKC-46		2162RA-052HJC-46	
4	52 (2)	50	6.0, 20″W(3)	2162RA-062HKC-47	6.0, 25″W(3)	2162RA-062HJC-47	
5	62 (2)	60	6.0, 25″W, 20″D (4)	2162RA-077HKC-48	6.0, 25″W, 20″D(4)	2162RA-077HJC-48	
6	77 (2)	75		2162RA-125HKC-49	6.0, 30″W, 20″D (4)	2162RA-125HJC-49	
	99 (2)	100		2162RA-125HKC-50		2162RA-125HJC-50	
	125 (2)	125		2162RA-144HKC-51	6.0, 35″W, 20″D (4)	2162RA-144HJC-51	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output current ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Ampere ratings are at 2 kHz carrier frequency. If carrier frequencies above 2 kHz are selected, the drive output current ratings **can** require derating. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative and to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(3) Frame mounted unit, section does not have vertical wireway.

(4) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5″ deeper than standard.

Units—2163R Combination PowerFlex 700 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 380…415V AC (NORMAL DUTY)

- See page 215 for product description.
- Normal Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds and 150% for 3 seconds.
- For specific drive applications refer to the PowerFlex 700 User Manual, publication 20B-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan.
  Branch circuit (overload) protection is provided by the internal drive overload.
- PowerFlex700 AC drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 700 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive. Give strong consideration to placing units with drives at the bottom of the section. When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Interface Type are required. Select on page 288 and 289.
- Combination VFD units at these voltages are not UL or C-UL listed.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 700 drive units according to the application and output ampere rating.

Table 194 - Bulletin 2163R PowerFlex 700 VFD Units (380…415V Normal Duty)

Frame	Rating (1)	Nominal kW	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
	Normal Duty	380-415V	Space Factor	Catalog Number (3)	Space Factor	Catalog Number (3)	
0	1.3	0.37	2.0	2163RA-1P3NK_-33K_	2.0	2163RA-1P3NJ_-33K_	PE
	1.5	0.55		2163RA-2P1NK_-34K_		2163RA-2P1NJ_-34K_	
	2.1	0.75		2163RA-2P1NK_-35K_		2163RA-2P1NJ_-35K_	
	2.6	1.1		2163RA-3P5NK_-36K_		2163RA-3P5NJ_-36K_	
	3.5	1.5		2163RA-3P5NK_-37K_		2163RA-3P5NJ_-37K_	
	5.0	2.2		2163RA-5P0NK_-38K_		2163RA-5P0NJ_-38K_	
	8.7	3.7		2163RA-8P7NK_-39K_	2.5	2163RA-8P7NJ_-39K_	
	11.5	5.5		2163RA-011NK_-40K_		2163RA-011NJ_-40K_	
1	15.4	7.5		2163RA-015NK_-41K_		2163RA-015NJ_-41K_	
	22	11		2163RA-022NK_-42K_	3.0	2163RA-022NJ_-42K_	
2	30	15	2.5	2163RA-030NK_-43K_		2163RA-030NJ_-43K_	
	37	18.5		2163RA-037NK_-44K_		2163RA-037NJ_-44K_	
3	43	22	3.0	2163RA-043NK_-45K_	3.5	2163RA-043NJ_-45K_	
	56	30		2163RA-056NK_-46K_	4.0	2163RA-056NJ_-46K_	
	72	37	3.5	2163RA-072NK_-47K_		2163RA-072NJ_-47K_	
5	85	45	6.0, 25″W, 20″D(2)	2163RA-105NK_-48K_	6.0, 25″W, 20″D(2)	2163RA-105NJ_-48K_	PE-II
	105	55		2163RA-105NK_-49K_		2163RA-105NJ_-49K_	
6	138	75		2163RA-170NK_-50K_	6.0, 30″W, 20″D(2)	2163RA-170NJ_-50K_	
	170	90		2163RA-170NK_-51K_		2163RA-170NJ_-51K_	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output current ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5″ deeper than standard.

(3) The catalog numbers listed are not complete:
Select the appropriate voltage code: 380V = N, 400V = KN, 415 = I (for example, 2163RA-037NK**N**).
Select the appropriate suffix from table on page 322 to identify the circuit breaker type (for example, 2163RA-037NKN-44K**THM**).

Units—2163R Combination PowerFlex 700 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 480V AC (NORMAL DUTY)

- See page 215 for product description.
- Normal Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds and 150% for 3 seconds.
- For specific drive applications refer to the PowerFlex 700 User Manual, publication 20B-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan.
  Branch circuit (overload) protection is provided by the internal drive overload.
- PowerFlex700 AC drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 700 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive. Give strong consideration to placing units with drives at the bottom of the section. When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Interface Type are required. Select on page 288 and 289.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 700 drive units according to the application and output ampere rating.

Table 195 - Bulletin 2163R PowerFlex 700 VFD Units (480V Normal Duty)

Frame	Rating (1)	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
	Normal Duty	480V	Space Factor	Catalog Number (4)	Space Factor	Catalog Number (4)	
0	1.1	0.5	2.0	2163RA-1P1NKB-33_	2.0	2163RA-1P1NJB-33_	SC
	1.6	0.75		2163RA-2P1NKB-34_		2163RA-2P1NJB-34_	
	2.1	1		2163RA-2P1NKB-35_		2163RA-2P1NJB-35_	
	3.0	1.5		2163RA-3P4NKB-36_		2163RA-3P4NJB-36_	
	3.4	2		2163RA-3P4NKB-37_		2163RA-3P4NJB-37_	
	5.0	3		2163RA-5P0NKB-38_		2163RA-5P0NJB-38_	
	8.0	5		2163RA-8P0NKB-39_	2.5	2163RA-8P0NJB-39_	
	11	7.5		2163RA-011NKB-40_		2163RA-011NJB-40_	
1	14	10		2163RA-014NKB-41_		2163RA-014NJB-41_	
	22	15		2163RA-022NKB-42_	3.0	2163RA-022NJB-42_	
2	27	20	2.5	2163RA-027NKB-43_		2163RA-027NJB-43_	
	34	25		2163RA-034NKB-44_		2163RA-034NJB-44_	
3	40	30	3.0	2163RA-040NKB-45_	3.5	2163RA-040NJB-45_	
	52	40		2163RA-052NKB-46_	4.0	2163RA-052NJB-46_	
	65	50	3.5	2163RA-065NKB-47_		2163RA-065NJB-47_	
4	77	60	6.0, 20″ W(2)	2163RA-077NKB-48_	6.0, 25″ W(2)	2163RA-077NJB-48_	SC-II
5	96	75	6.0 25″W, 20″D(3)	2163RA-096NKB-49_	6.0 25″W, 20″D(3)	2163RA-096NJB-49_	
	125	100		2163RA-125NKB-50_		2163RA-125NJB-50_	
6	156	125		2163RA-156NKB-51_	6.0 30″W, 20″D(3)	2163RA-156NJB-51_	
	180	150		2163RA-180NKB-52_	6.0 35″W, 20″D(3)	2163RA-180NJB-52_	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output current ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Frame mounted unit, section does not have vertical wireway.

(3) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5″ deeper than standard.

(4) The catalog numbers listed are not complete:

- Select the appropriate suffix from table on page 322 to identify the circuit breaker type (for example, 2163RA-034NKB-44**THM**).

Units—2163R Combination PowerFlex 700 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 480V AC (HEAVY DUTY)

- See page 215 for product description.
- Heavy Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 150% for 60 seconds and 200% for 3 seconds.
- For specific drive applications refer to the PowerFlex 700 User Manual, publication 20B-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan.
  Branch circuit (overload) protection is provided by the internal drive overload.
- PowerFlex 700 drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 700 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing units with drives at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Interface Type are required. Select on page 288 and 289.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 700 drive units according to the application and output ampere rating.

Table 196 - Bulletin 2163R PowerFlex 700 VFD Units (480V Heavy Duty)

Frame	Rating (1)	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
	Heavy Duty	480V	Space Factor	Catalog Number (4)	Space Factor	Catalog Number (4)	
0	1.1	0.5	2.0	2163RA-2P1HKB-33_	2.0	2163RA-2P1HJB-33_	SC
	1.6	0.75		2163RA-2P1HKB-34_		2163RA-2P1HJB-34_	
	2.1	1		2163RA-3P4HKB-35_		2163RA-3P4HJB-35_	
	3.0	1.5		2163RA-3P4HKB-36_		2163RA-3P4HJB-36_	
	3.4	2		2163RA-5P0HKB-37_		2163RA-5P0HJB-37_	
	5.0	3		2163RA-8P0HKB-38_	2.5	2163RA-8P0HJB-38_	
	8.0	5		2163RA-011HKB-39_		2163RA-011HJB-39_	
1	11	7.5		2163RA-014HKB-40_		2163RA-014HJB-40_	
	14	10		2163RA-022HKB-41_	3.0	2163RA-022HJB-41_	
2	22	15	2.5	2163RA-027HKB-42_		2163RA-027HJB-42_	
	27	20		2163RA-034HKB-43_		2163RA-034HJB-43_	
3	34	25	3.0	2163RA-040HKB-44_	3.5	2163RA-040HJB-44_	
	40	30		2163RA-052HKB-45_	4.0	2163RA-052HJB-45_	
	52	40	3.5	2163RA-065HKB-46_		2163RA-065HJB-46_	
4	65	50	6.0, 20″ W(2)	2163RA-077HKB-47_	6.0, 25″ W(2)	2163RA-077HJB-47_	SC-II
5	77	60	6.0 25″W, 20″D(3)	2163RA-096HKB-48_	6.0 25″W, 20″D(3)	2163RA-096HJB-48_	
	96	75		2163RA-125HKB-49_		2163RA-125HJB-49_	
6	125	100		2163RA-156HKB-50_	6.0 30″W, 20″D(3)	2163RA-156HJB-50_	
	156	125		2163RA-180HKB-51_	6.0 35″W, 20″D(3)	2163RA-180HJB-51_	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output current ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Frame mounted unit, section does not have vertical wireway.

(3) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5″ deeper than standard.

(4) The catalog numbers listed are not complete:
Select the appropriate suffix from table on page 322 to identify the circuit breaker type (for example, 2163RA-040HKB-44**THM**).

Units—2163R Combination PowerFlex 700 Variable Frequency AC Drive (VFD) Units with Circuit Breaker Disconnect, 600V AC (NORMAL DUTY)

- See page 215 for product description.
- Normal Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds and 150% for 3 seconds.
- For specific drive applications refer to the PowerFlex 700 User Manual, publication 20B-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan.
  Branch circuit (overload) protection is provided by the internal drive overload.
- PowerFlex700 AC drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 700 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive. Give strong consideration to placing units with drives at the bottom of the section. When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Interface Type are required. Select on page 288 and 289.

IMPORTANT The horsepower ratings shown below are for reference only. Size PowerFlex 700 drive units according to the application and output ampere rating.

Table 197 - Bulletin 2163R PowerFlex 700 VFD Units (600V Normal Duty)

Frame	Rating	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
	Normal Duty	600V	Space Factor	Catalog Number(5)	Space Factor	Catalog Number(5)	
0	1.7 (1)	1	2.0	2163RA-1P7NKC-35_	2.0	2163RA-1P7NJC-35_	PE
	2.4 (1)	1.5		2163RA-2P7NKC-36_		2163RA-2P7NJC-36_	
	2.7 (1)	2		2163RA-2P7NKC-37_		2163RA-2P7NJC-37_	
	3.9 (1)	3		2163RA-3P9NKC-38_		2163RA-3P9NJC-38_	
	6.1 (1)	5		2163RA-6P1NKC-39_	2.5	2163RA-6P1NJC-39_	
	9.0 (1)	7.5		2163RA-9P0NKC-40_		2163RA-9P0NJC-40_	
1	11 (1)	10		2163RA-011NKC-41_		2163RA-011NJC-41_	
	17 (1)	15		2163RA-017NKC-42_	3.0	2163RA-017NJC-42_	
2	22 (1)	20	2.5	2163RA-022NKC-43_		2163RA-022NJC-43_	
	27 (1)	25		2163RA-027NKC-44_		2163RA-027NJC-44_	
3	32 (1)	30	3.0	2163RA-032NKC-45_	3.5	2163RA-032NJC-45_	
	41 (1)	40		2163RA-041NKC-46_	4.0	2163RA-041NJC-46_	
	52 (1)	50	3.5	2163RA-052NKC-47_		2163RA-052NJC-47_	
4	62 (2)	60	6.0, 20″W(3)	2163RA-062NKC-48_	6.0, 25″W(3)	2163RA-062NJC-48_	
5	77 (2)	75	6.0, 25″W, 20″D(4)	2163RA-077NKC-49_	6.0, 25″W, 20″D(4)	2163RA-077NJC-49_	
6	99 (2)	100		2163RA-125NKC-50_	6.0, 30″W, 20″D(4)	2163RA-125NJC-50_	
	125 (2)	125		2163RA-125NKC-51_		2163RA-125NJC-51_	
	144 (2)	150		2163RA-144NKC-52_	6.0, 35″W, 20″D(4)	2163RA-144NJC-52_	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output current ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Ampere ratings are at 2 kHz carrier frequency. If carrier frequencies above 2 kHz are selected, the drive output current ratings **can** require derating. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative and to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(3) Frame mounted unit, section does not have vertical wireway.

(4) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5″ deeper than standard.

(5) The catalog numbers listed are not complete:

- Select the appropriate suffix from table on page 322 to identify the circuit breaker type (for example, 2163RA-027NKC-44**THM**).

Units—2163R Combination PowerFlex 700 Variable Frequency AC Drive (VFD) Units with Circuit Breaker Disconnect, 600V AC (HEAVY DUTY)

- See page 215 for product description.
- Heavy Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 150% for 60 seconds and 200% for 3 seconds.
- For specific drive applications refer to the PowerFlex 700 User Manual, publication 20B-UM001.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, control circuit transformer, door, and unit support pan.
  Branch circuit (overload) protection is provided by the internal drive overload.
- PowerFlex 700 drives are cULus (UL and C-UL listed) as motor overload protected devices.
  An external overload relay is not required for single motor applications.
  PowerFlex 700 AC drives are not intended for use with single phase motors.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can accept 16 AWG control wire maximum.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing units with drives at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- HIM (Human Interface Module) and Control Interface Type are required. Select on page 288 and 289.

IMPORTANT The horsepower ratings shown below are for reference only. Size PowerFlex 700 drive units according to the application and output ampere rating.

Table 198 - Bulletin 2163R PowerFlex 700 VFD Units (600V Heavy Duty)

Frame	Rating	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA Type 12		Delivery Program
	Heavy Duty	600V	Space Factor	Catalog Number(5)	Space Factor	Catalog Number(5)	
0	1.7 (1)	1	2.0	2163RA-2P7HKC-35_	2.0	2163RA-2P7HJC-35_	PE
	2.4 (1)	1.5		2163RA-2P7HKC-36_		2163RA-2P7HJC-36_	
	2.7 (1)	2		2163RA-3P9HKC-37_		2163RA-3P9HJC-37_	
	3.9 (1)	3		2163RA-6P1HKC-38_	2.5	2163RA-6P1HJC-38_	
	6.1 (1)	5		2163RA-9P0HKC-39_		2163RA-9P0HJC-39_	
1	9.0 (1)	7.5		2163RA-011HKC-40_		2163RA-011HJC-40_	
	11 (1)	10		2163RA-017HKC-41_	3.0	2163RA-017HJC-41_	
2	17 (1)	15	2.5	2163RA-022HKC-42_		2163RA-022HJC-42_	
	22 (1)	20		2163RA-027HKC-43_		2163RA-027HJC-43_	
3	27 (1)	25	3.0	2163RA-032HKC-44_	3.5	2163RA-032HJC-44_	
	32 (1)	30		2163RA-041HKC-45_	4.0	2163RA-041HJC-45_	
	41 (1)	40	3.5	2163RA-052HKC-46_		2163RA-052HJC-46_	
4	52 (2)	50	6.0, 20"W(3)	2163RA-062HKC-47_	6.0, 25"W(3)	2163RA-062HJC-47_	
5	62 (2)	60	6.0, 25"W, 20"D (4)	2163RA-077HKC-48_	6.0, 25"W, 20"D(4)	2163RA-077HJC-48_	
6	77 (2)	75		2163RA-125HKC-49_	6.0, 30"W, 20"D (4)	2163RA-125HJC-49_	
	99 (2)	100		2163RA-125HKC-50_		2163RA-125HJC-50_	
	125 (2)	125		2163RA-144HKC-51_	6.0, 35"W, 20"D (4)	2163RA-144HJC-51_	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output current ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(2) Ampere ratings are at 2 kHz carrier frequency. If carrier frequencies above 2 kHz are selected, the drive output current ratings **can** require derating. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative and to the PowerFlex 70/700 Reference Manual, publication PFLEX-RM001.

(3) Frame mounted unit, section does not have vertical wireway.

(4) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5" deeper than standard.

(5) The catalog numbers listed are not complete:

- Select the appropriate suffix from table on page 322 to identify the circuit breaker type (for example, 2163RA-032HKC-44**THM**).

Bulletin 2162T and 2163T PowerFlex 40 Drive

These combination variable frequency AC motor drive units are specifically designed for use in CENTERLINE motor control centers. Each unit contains a high performance, microprocessor-controlled, variable frequency AC drive and either a fusible disconnect switch or a circuit breaker.

They also:

- Include isolated logic and power.
- Include fans and venting where required. See page 364.
- Include UL Class CC or J time delay fuses. These fuses provide both branch circuit protection and drive input protection. The drive input fuses are provided in series with the circuit breaker in Bulletin 2163T units.
- Include control circuit transformer (CCT). The CCT is sized to provide power for all standard pilot devices and any required fans.
- Produce a three-phase, pulse width modulated (PWM) adjustable frequency output and voltage output for exceptional control of motor speed and torque.
- Are digitally programmable with access to mode programming, providing precise and repeatedly accurate setup, control and operation, and adaptability to handle a variety of applications.

Bulletin 2162T and 2163T use **normal duty** PowerFlex 40 drives.

Each unit is provided as a NEMA Wiring Class I, Type A unit with terminals mounted on the drive chassis for connection of items such as, remote pilot devices and input signals. For NEMA Type 3R and NEMA Type 4 enclosure construction, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Catalog Number Explanation - Bulletin 2162T and 2163T PowerFlex 40 Drive

- Bulletins 2162T and 2163T use PowerFlex 40 Drives
- Bulletins 2162T and 2163T are sized for Normal Duty applications
- NEMA Enclosure Type 1, Type 1 with gasket or Type 12 Enclosure Type
- UL Class CC or J time delay drive input fuses provide both branch circuit and drive input protection, fuse class dependent on drive rating
- Isolated logic and power produces a three-phase, pulse-width-modulated (PWM) adjustable frequency output to vary motor speed

Table 199 -

2162T	**A**	-	**6P0**	**K**	**B**	-	**38**	-	**14HBA3**
2163T	**A**	-	**6P0**	**K**	**B**	-	**38THM**	-	**14HBA3**
Bulletin Number	Wiring Type		PowerFlex 40 Nominal Output Current Rating	NEMA Enclosure Type	Line Voltage		Nominal Horsepower/kW and Circuit Breaker Type		Human Interface Module and Options

Code	Type
2162T	PowerFlex 40 Variable Frequency AC Drive with Fusible Disconnect
2163T	PowerFlex 40 Variable Frequency AC Drive with Circuit Breaker

Code	Wiring Type
A	Type A

Nominal Constant Current Ratings (Amperes)			
380-480V Line Voltage		**600V Line Voltage**	
Code	**Ratings**	**Code**	**Ratings**
1P4	1.4	1P7	1.7
2P3	2.3	3P0	3.0
4P0	4.0	4P2	4.2
6P0	6.0	6P6	6.6
010	10.5	9P9	9.9
012	12	012	12.2
017	17	019	19
024	24		

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Line Voltage
N	380V (1)
KN	400V (1)
I	415V (1)
B	480V
C	600V

(1) Units at these voltages are not UL or C-UL listed.

Code	Nominal Horsepower/kW Code and Circuit Breaker Type
2162T-'38'	'38' Nominal Horsepower/kW code. See Table 266 and Table 267.
2163T-'38THM'	'38_' Nominal Horsepower/kW code. See Table 266 and Table 267. '___THM' Circuit Breaker Type. See table on page 322

Code	Human Interface Module and Options
	See options section beginning on page 285

Units—2162T Combination PowerFlex 40 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 380…480V AC

- See page 237 for product description.
- For specific drive applications refer to PowerFlex 40 User Manual, publication 22B-UM001.
- All PowerFlex ratings are **Normal Duty**.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, 80VA control circuit transformer, door, and unit support pan. Branch circuit (overload) protection is provided by the internal drive overload.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can only accept 16 AWG control wire.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive. Give strong consideration to placing units with drives at the bottom of the section. When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- Internal HIM (Human Interface Module) is included. Optional door mounted HIMs can be selected on page 288.
- PowerFlex 40 AC drives are cULus (UL and C-UL listed) as motor overload protective devices. An external overload relay is not required for single motor applications. PowerFlex 40 AC drives are not intended for use with single phase motors.

IMPORTANT The horsepower and kW ratings shown below are for reference only. Size PowerFlex 40 drive units according to the application and output ampere rating.

Table 200 - 2162T 380…480V VFD Units w/Fusible Disconnect (Normal Duty Ratings)

Frame	Rating(1)	Nominal kW	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA 12		Delivery Program
		380…415V(2)	480V	Space Factor	Catalog Number (4)	Space Factor	Catalog Number (4)	
B	1.4	0.37	0.5	1.0(3)	2162TA-1P4K_-_	1.5 (3)	2162TA-1P4J_-_	SC
	2.3	0.55…0.75	0.75…1.0		2162TA-2P3K_-_		2162TA-2P3J_-_	
	4.0	1.1…1.5	2.0		2162TA-4P0K_-_		2162TA-4P0J_-_	
	6.0	2.2	3.0		2162TA-6P0K_-_		2162TA-6P0J_-_	
	10.5	3.7	5.0		2162TA-010K_-_	2.0 (3)	2162TA-010J_-_	
C	12	5.5	7.5	2.0 (3)	2162TA-012K_-_	2.5 (3)	2162TA-012J_-_	
	17	7.5	10		2162TA-017K_-_		2162TA-017J_-_	
	24	11	15		2162TA-024K_-_	3.0 (3)	2162TA-024J_-_	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output current ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 40 User Manual, publication 22B-UM001.

(2) Units at these voltages are not UL listed or C-UL listed

(3) Adding options to this catalog number can result in an increased space factor.

(4) The catalog numbers listed are not complete:

- Select voltage code from table on page 314 to the horsepower rating desired (for example,2162TA-1P4KB).
- Select the number from table on page 314 that corresponds to the horsepower or kilowatt rating desired (for example, 2162TA-1P4KB-**33** or 2162TA-1P4KN-**33K**).

Table 201 - PowerFlex 40 Space Factors with Options

Voltage Rating	Frame	Drive Rating	NEMA 1/1G					NEMA 12				
			Base Unit (Space Factor)	Control Station (-1, 3, 4 or 5)	Isolated Signal Conditioner (-14N2)	Line or Load Reactors (-14R_ _)	Isolated Signal Conditioner (-14N2) AND Line or Load Reactors	Base Unit (Space Factor)	Control Station (-1, 3, 4 or 5)	Isolated Signal Conditioner (-14N2)	Line or Load Reactors (-14R_ _)	Isolated Signal Conditioner (-14N2) AND Line or Load Reactors
380, 400, 415	B	1.4 A	1.0	1.5	1.5	N/A	N/A	1.5	1.5	1.5	N/A	N/A
		2.3 A										
		4.0 A										
		6.0 A										
		10.5 A						2.0	2.0	2.0		
	C	12 A	2.0	2.0	2.0	N/A	N/A	2.5	2.5	2.5	N/A	N/A
		17 A										
		24 A						3.0	3.0	3.0		
480	B	1.4 A	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0
		2.3 A										
		4.0 A										
		6.0 A					2.0					
		10.5 A						2.0	2.0	2.0	2.5	2.5
	C	12 A	2.0	2.0	2.0	2.0		2.5	2.5	2.5		
		17 A										
		24 A						3.0	3.0	3.0	3.0	3.0

Units—2162T Combination PowerFlex 40 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 600V AC

- See page 237 for product description.
- For specific drive applications refer to PowerFlex 40 User Manual, publication 22B-UM001.
- All PowerFlex ratings are **Normal Duty**.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, 80VA control circuit transformer, door, and unit support pan. Branch circuit (overload) protection is provided by the internal drive overload.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can only accept 16 AWG control wire.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive. Give strong consideration to placing units with drives at the bottom of the section. When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- Internal HIM (Human Interface Module) is included. Optional door mounted HIMs can be selected on page 288.
- PowerFlex 40 AC drives are cULus (UL and C-UL listed) as motor overload protective devices. An external overload relay is not required for single motor applications. PowerFlex 40 AC drives are not intended for use with single phase motors.

IMPORTANT The HP ratings shown below are for reference only. Size PowerFlex 40 drive units according to the application and output ampere rating.

Table 202 - Bulletin 2162T PowerFlex 40 VFD Units (600V Normal Duty)

Frame	Rating(1)	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA 12		Delivery Program
			Space Factor	Catalog Number(3)	Space Factor	Catalog Number(3)	
B	1.7	1.0	1.0 (2)	2162TA-1P7K_-_	1.5 (2)	2162TA-1P7J_-_	PE
	3.0	1.5 - 2.0		2162TA-3P0K_-_		2162TA-3P0J_-_	
	4.2	3.0		2162TA-4P2K_-_		2162TA-4P2J_-_	
	6.6	5.0		2162TA-6P6K_-_	2.0 (2)	2162TA-6P6J_-_	
C	9.9	7.5	2.0 (2)	2162TA-9P9K_-_	2.5 (2)	2162TA-9P9J_-_	
	12.2	10		2162TA-012K_-_		2162TA-012J_-_	
	19.0	15		2162TA-019K_-_	3.0 (2)	2162TA-019J_-_	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output current ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 40 User Manual, publication 22B-UM001.

(2) Adding options to this catalog number can result in an increased space factor.

(3) The catalog numbers listed are not complete:
- Select voltage code from table on page 314 to the horsepower rating desired (for example, 2162TA-1P7K**C**).
- Select the number from table on page 314 that corresponds to the horsepower rating desired (for example, 2162TA-1P7KC-**35**).

Table 203 - PowerFlex 40 Space Factors with Options

Voltage Rating	Frame	Drive Rating	NEMA 1/1G					NEMA 12				
			Base Unit (Space Factor)	Control Station (-1, 3, 4 or 5)	Isolated Signal Conditioner (-14N2)	Line or Load Reactors (-14R_ _)	Isolated Signal Conditioner (-14N2) AND Line or Load Reactors	Base Unit (Space Factor)	Control Station (-1, 3, 4 or 5)	Isolated Signal Conditioner (-14N2)	Line or Load Reactors (-14R_ _)	Isolated Signal Conditioner (-14N2) AND Line or Load Reactors
600	B	1.7 A	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0
		3.0 A										
		4.2 A										
		6.6 A					2.0	2.0	2.0	2.0	2.5	2.5
	C	9.9 A	2.0	2.0	2.0	2.0	2.0	2.5	2.5	2.5		
		12.2 A										
		19 A						3.0	3.0	3.0	3.0	3.0

Units—2163T Combination PowerFlex 40 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 380…480V AC

- See page 237 for product description.
- For specific drive applications refer to PowerFlex 40 User Manual, publication 22B-UM001.
- All PowerFlex ratings are **Normal Duty**.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, 80VA control circuit transformer, door, and unit support pan. Branch circuit (overload) protection is provided by the internal drive overload.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can only accept 16 AWG control wire.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive. Give strong consideration to placing units with drives at the bottom of the section. When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- Internal HIM (Human Interface Module) is included. Optional door mounted HIMs can be selected on page 288.
- PowerFlex 40 AC drives are cULus (UL and C-UL listed) as motor overload protective devices. An external overload relay is not required for single motor applications. PowerFlex 40 AC drives are not intended for use with single phase motors.

IMPORTANT The HP and kW ratings shown below are for reference only. Size PowerFlex 40 drive units according to the application and output ampere rating.

Table 204 - Bulletin 2162T PowerFlex 40 VFD Units (380…480V Normal Duty)

Frame	Rating[1]	Nominal kW	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA 12		Delivery Program
		380…415V [2]	480V	Space Factor	Catalog Number [4]	Space Factor	Catalog Number [4]	
B	1.4	0.37	0.5	1.0 [3]	2163TA-1P4K_-_	1.5 [3]	2163TA-1P4J_-_	SC
	2.3	0.55…0.75	0.75…1.0		2163TA-2P3K_-_		2163TA-2P3J_-_	
	4.0	1.1…1.5	1.5…2.0		2163TA-4P0K_-_		2163TA-4P0J_-_	
	6.0	2.2	3.0		2163TA-6P0K_-_		2163TA-6P0J_-_	
	10.5	3.7	5.0		2163TA-010K_-_	2.0 [3]	2163TA-010J_-_	
C	12	5.5	7.5	2.0 [3]	2163TA-012K_-_	2.5 [3]	2163TA-012J_-_	
	17	7.5	10		2163TA-017K_-_		2163TA-017J_-_	
	24	11	15		2163TA-024K_-_	3.0 [3]	2163TA-024J_-_	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output current ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 40 User Manual, publication 22B-UM001.

(2) Units at these voltages are not UL listed or C-UL listed.

(3) Adding options to this catalog number can result in an increased space factor.

(4) The catalog numbers listed are not complete:

- Select voltage code from table on page 314 to the horsepower rating desired (for example, 2163TA-1P4K**B**).
- Select the number from table on page 314 that corresponds to the horsepower rating desired (for example, 2163TA-1P4KB-**33**).
- Select the appropriate suffix from table on page 322 to identify the circuit breaker type (for example, 2163TA-1P4KB-33**THM**).

Table 205 - PowerFlex 40 Space Factors with Options

Voltage Rating	Frame	Drive Rating	NEMA 1/1G					NEMA 12				
			Base Unit (Space Factor)	Control Station (-1, 3, 4 or 5)	Isolated Signal Conditioner (-14N2)	Line or Load Reactors (-14R_ _)	Isolated Signal Conditioner (-14N2) AND Line or Load Reactors	Base Unit (Space Factor)	Control Station (-1, 3, 4 or 5)	Isolated Signal Conditioner (-14N2)	Line or Load Reactors (-14R_ _)	Isolated Signal Conditioner (-14N2) AND Line or Load Reactors
380, 400, 415	B	1.4 A	1.0	1.5	1.5	N/A	N/A	1.5	1.5	1.5	N/A	N/A
		2.3 A										
		4.0 A										
		6.0 A										
		10.5 A						2.0	2.0	2.0		
	C	12 A	2.0	2.0	2.0	N/A	N/A	2.5	2.5	2.5	N/A	N/A
		17 A										
		24 A						3.0	3.0	3.0		
480	B	1.4 A	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0
		2.3 A										
		4.0 A										
		6.0 A					2.0					
		10.5 A						2.0	2.0	2.0	2.5	2.5
	C	12 A	2.0	2.0	2.0	2.0		2.5	2.5	2.5		
		17 A										
		24 A						3.0	3.0	3.0	3.0	3.0

Units—2163T Combination PowerFlex 40 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 600V AC

- See page 237 for product description.
- For specific drive applications refer to PowerFlex 40 User Manual, publication 22B-UM001.
- All PowerFlex ratings are **Normal Duty**.
- Basic configuration includes branch circuit (short circuit)/drive input fuses, 80VA control circuit transformer, door, and unit support pan. Branch circuit (overload) protection is provided by the internal drive overload.
- See page 358 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type A only. Drive can only accept 16 AWG control wire.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive. Give strong consideration to placing units with drives at the bottom of the section. When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- Internal HIM (Human Interface Module) is included. Optional door mounted HIMs can be selected on page 288.
- PowerFlex 40 AC drives are cULus (UL and C-UL listed) as motor overload protective devices. An external overload relay is not required for single motor applications. PowerFlex 40 AC drives are not intended for use with single phase motors.

IMPORTANT The HP ratings shown below are for reference only. Size PowerFlex 40 drive units according to the application and output ampere rating.

Table 206 - Bulletin 2163T PowerFlex 40 VFD Units (600V Normal Duty)

Frame	Rating(1)	Nominal HP	NEMA Type 1 and Type 1 w/gasket		NEMA 12		Delivery Program
			Space Factor	Catalog Number (3)	Space Factor	Catalog Number (3)	
B	1.7	1.0	1.0 (2)	2163TA-1P7K_-_	1.5 (2)	2163TA-1P7J_-_	PE in U.S., SC in Canada
	3.0	1.5…2.0		2163TA-3P0K_-_		2163TA-3P0J_-_	
	4.2	3.0		2163TA-4P2K_-_		2163TA-4P2J_-_	
	6.6	5.0		2163TA-6P6K_-_	2.0 (2)	2163TA-6P6J_-_	
C	9.9	7.5	2.0 (2)	2163TA-9P9K_-_	2.5 (2)	2163TA-9P9J_-_	
	12.2	10		2163TA-012K_-_		2163TA-012J_-_	
	19.0	15		2163TA-019K_-_	3.0 (2)	2163TA-019J_-_	

(1) Ampere ratings are at a 4 kHz carrier frequency. If carrier frequencies above 4 kHz are selected, the drive output current ratings **must** be derated. For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 40 User Manual, publication 22B-UM001.

(2) Adding options to this catalog number can result in an increased space factor.

(3) The catalog numbers listed are not complete:
- Select voltage code from table on page 314 to the horsepower rating desired (for example, 2163TA-1P7K**C**).
- Select the number from table on page 314 that corresponds to the horsepower rating desired (for example, 2163TA-1P7KC-**35**).
- Select the appropriate suffix from table on page 322 to identify the circuit breaker type (for example, 2163TA-1P4KB-33**THM**).

Table 207 - PowerFlex 40 Space Factors with Options

Voltage Rating	Frame	Drive Rating	NEMA 1/1G					NEMA 12				
			Base Unit (Space Factor)	Control Station (-1, 3, 4 or 5)	Isolated Signal Conditioner (-14N2)	Line or Load Reactors (-14R_ _)	Isolated Signal Conditioner (-14N2) AND Line or Load Reactors	Base Unit (Space Factor)	Control Station (-1, 3, 4 or 5)	Isolated Signal Conditioner (-14N2)	Line or Load Reactors (-14R_ _)	Isolated Signal Conditioner (-14N2) AND Line or Load Reactors
600	B	1.7 A	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0
		3.0 A										
		4.2 A										
		6.6 A					2.0	2.0	2.0	2.0	2.5	2.5
	C	9.9 A	2.0	2.0	2.0	2.0	2.0	2.5	2.5	2.5		
		12.2 A										
		19 A						3.0	3.0	3.0	3.0	3.0

Bulletin 2162U and 2163U PowerFlex 753 Drive

These combination variable frequency AC motor drive units are specifically designed for use in CENTERLINE motor control centers. Each unit contains a high performance, microprocessor-controlled, variable frequency AC drive and either a fusible disconnect switch or a circuit breaker.

They also:

- Include isolated logic and power.
- Include fans and venting where required. See page 363.
- Include internal electronic overload protection.
- Include control circuit transformer (CCT). The CCT is sized to provide power for all standard pilot devices and any required fans.
- Produce a three-phase, pulse width modulated (PWM) adjustable frequency output and voltage output for exceptional control of motor speed and torque.
- Are digitally programmable with access to mode programming, providing precise and repeatedly accurate set-up, control, and operation, and adaptability to handle a variety of applications.
- Have available 24V DC or 115V AC control voltages.
- A Human Interface Module (HIM) must be selected.
- Bulletin 2162U and 2163U use PowerFlex 753 drives.

IMPORTANT In 480V applications, UL Class J time delay fuses are optional for both branch circuit protection and drive input protection.
In 600V applications, UL Class J time delay fuses are required for both branch circuit protection and drive input protection.

Each unit is provided as a NEMA Wiring Class I, Type B-T unit with terminals mounted in the unit for connection of remote items such as pilot devices and input signals. For NEMA Type 3R and NEMA Type 4 enclosure construction, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Catalog Number Explanation - Bulletin 2162U and 2163U PowerFlex 753 Drive

Table 208 -

2162U	B	-	034N	K	B	-	44	-	14HA0
2163U	B	-	034N	K	B	-	44THM	-	14HA0
Bulletin Number	Wiring Type		PowerFlex 753 Nominal Output Current Rating	NEMA Enclosure Type	Line Voltage		Nominal Horsepower/kW and Circuit Breaker Type		Human Interface Module and Options

Code	Type
2162U	PowerFlex 753 Variable Frequency AC Drive with Fusible Disconnect
2163U	PowerFlex 753 Variable Frequency AC Drive with Circuit Breaker

Code	Wiring Type
B	Type B

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Line Voltage
B	480V
C	600V

Code	Nominal Horsepower/kW Code and Circuit Breaker Type
2162U-'33'	'33_' Nominal Horsepower/kW code. See Table 266 and Table 267.
2163U-'33THM'	'33' Nominal Horsepower/kW code. See Table 266 and Table 267. '___THM' Circuit Breaker Type. See table on page 322

Code	Human Interface Module and Options
See options section beginning on page 285	

Drive Size Code, Output Current Rating (Amperes) and Nominal HP or (kW) (1)															
Normal Duty Applications								Heavy Duty Applications							
480V Line Voltage				600V Line Voltage				480V Line Voltage				600V Line Voltage			
Code	Frame	Ratings	HP	Code	Frame	Ratings	HP	Code	Frame	Ratings	HP	Code	Frame	Ratings	HP
2P1H(2)	2	2.1	1	1P7N	3	0.9	0.5	2P1H	2	2.1	1	1P7H	3	0.9	0.5
3P4H	2	3.0	1.5	1P7N	3	1.3	0.75	3P4H	2	3.0	1.5	2P7H	3	1.3	0.75
3P4H	2	3.4	2	1P7N	3	1.7	1	3P4H	2	3.4	2	2P7H	3	1.7	1
5P0H	2	5.0	3	2P7N	3	2.4	1.5	5P0H	2	5.0	3	3P9H	3	2.4	1.5
8P0H	2	8.0	5	2P7N	3	2.7	2	8P0H	2	8.0	5	3P9N	3	2.7	2
011H	2	11	7.5	3P9N	3	3.9	3	011H	2	11	7.5	6P1H	3	3.9	3
014N	2	14	10	6P1N	3	6.1	5	022H	2	14	10	9P0H	3	6.1	5
022N	2	22	15	9P0N	3	9	7.5	027H	3	22	15	011H	3	9	7.5
027N	3	27	20	011N	3	11	10	034H	3	27	20	017H	3	11	10
034N	3	34	25	017N	3	17	15	040H	3	34	25	022H	3	17	15
040N	3	40	30	022N	3	22	20	052H	4	40	30	027H	4	22	20
052N	4	52	40	027N	4	27	25	065H	4	52	40	032H	4	27	25
065N	4	65	50	032N	4	32	30	077H	5	65	50	041H	5	32	30
077H	5	077	60	041N	5	41	40	096H	5	77	60	052H	5	41	40
096H	5	096	75	052N	5	52	50	125H	6	96	75	063H	6	52	50
125H	6	125	100	063N	6	63	60	156H	6	125	100	077H	6	63	60
156H	6	156	125	077N	6	77	75	186H	6	150	125	099H	6	77	75
186H	6	186	150	099N	6	99	100	248H	6	186	150	125H	6	99	100
248H	6	248	200	125N	6	125	125					144H	6	125	125
				144N	6	144	150								

(1) The kW and HP ratings shown are for reference only. Size PowerFlex 750 drive units according to the applications and output ampere rating.

(2) Drive comes pre-programmed for Heavy Duty Applications. Refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

Units -- 2162U Combination PowerFlex 753 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V AC and 600V AC, Normal Duty

- Normal Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds, 150% for 3 seconds.
- For specific drive applications refer to the PowerFlex 750 Series Programming Manual, publication 750-PM001.
- Basic configuration includes an appropriately sized control circuit transformer (for pilot lights and/or fans), door, and unit support pan.
- Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 753 AC drives are cULus (UL and C-UL listed) as motor overload protected devices.
- An external overload relay is not required for single motor applications.
- PowerFlex 753 AC drive units are not intended for use with single phase motors.
- Units with fusible disconnect switch do not include factory supplied/installed branch circuit/drive input fusing. Optional factory supplied/installed UL Class J branch circuit/drive input fusing is available. If fusing is not factory installed, UL Class J fuse clips will be provided, sized based on the fuse size that would be factory installed
- Combination Unit Short Circuit Rating is 100 kA for 480V. See Table 319.
- Wiring is Type B. Control terminal block can accept maximum of one #12 AWG wire or two #16 AWG wires.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing drive units at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom.
- Do not mount transformer units below drive units. Heat from transformer units can cause the drive to trip.
- HIM (Human Interface Module) selection is required. Select from Options section.
- Drive includes two 24V DC Digital Inputs, one 24V DC/115V AC Digital Input, one Digital (Form-C Relay) Output, and one Analog Output.
- An I/O option module is available to provide an additional 6 Digital Inputs (select either 24V DC or 115V AC option module), two Digital (Form-C Relay) Outputs, two Analog Inputs and two Analog Outputs.

Table 209 - 2162U Combination PowerFlex 753 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V AC, Normal Duty

Frame	Rating[1]	Nominal HP[2]	NEMA Type 1 and Type 1 w/ gasket		NEMA Type 12		Delivery Program
	ND	480V	Space Factor	Catalog Number	Space Factor	Catalog Number	
2	14	10	2.5	2162UB-014NKB-41	2.5	2162UB-014NJB-41	SC
2	22	15	2.5	2162UB-022NKB-42	3.0	2162UB-022NJB-42	
3	27	20	2.5	2162UB-027NKB-43	3.5	2162UB-027NJB-43	
3	34	25	2.5	2162UB-034NKB-44	3.5	2162UB-034NJB-44	
3	40	30	3.0	2162UB-040NKB-45	3.5	2162UB-040NJB-45	
4	52	40	3.0	2162UB-052NKB-46	4.0	2162UB-052NJB-46	
4	65	50	3.0	2162UB-065NKB-47	4.0	2162UB-065NJB-47	
5	77	60	6.0 x 20" W x 15" D	2162UB-077NKB-48	6.0 x 25" W x 15" D	2162UB-077NJB-48	
5	96	75	6.0 x 25" W x 15" D	2162UB-096NKB-49	6.0 x 25" W x 15" D	2162UB-096NJB-49	
6	125	100	6.0 x 25" W x 20" D	2162UB-125NKB-50[3]	6.0 x 25" W x 20" D	2162UB-125NJB-50[3]	
6	156	125	6.0 x 25" W x 20" D	2162UB-156NKB-51[3]	6.0 x 30" W x 20" D	2162UB-156NJB-51[3]	
6	186	150	6.0 x 25" W x 20" D	2162UB-186NKB-52[3]	6.0 x 35" W x 20" D	2162UB-186NJB-52[3]	
6	248	200	6.0 x 30" W x 20" D	2162UB-248NKB-54[3]			

(1) The HP ratings shown are nominal values.
- Size PowerFlex 753 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed
- Do not use another size motor without verifying the suitability of the unit for that motor size
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

(2) The horsepower ratings shown are for reference only. Size PowerFlex 753 drive units according to the application and output ampere rating.

(3) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Table 210 - 2162U Combination PowerFlex 753 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 600V AC, Normal Duty

Frame	Rating(1)	Nominal HP(2)	NEMA Type 1 and Type 1 w/ gasket		NEMA Type 12		Delivery Program
	ND	600 V	Space Factor	Catalog Number	Space Factor	Catalog Number	
3	0.9	0.50	2.5	2162UB-1P7NKC-33	2.5	2162UB-1P7NJC-33	PE
3	1.3	0.75	2.5	2162UB-1P7NKC-34	2.5	2162UB-1P7NJC-34	
3	1.7	1	2.5	2162UB-1P7NKC-35	2.5	2162UB-1P7NJC-35	
3	2.4	1.5	2.5	2162UB-2P7NKC-36	2.5	2162UB-2P7NJC-36	
3	2.7	2.0	2.5	2162UB-2P7NKC-37	2.5	2162UB-2P7NJC-37	
3	3.9	3	2.5	2162UB-3P9NKC-38	2.5	2162UB-3P9NJC-38	
3	6.1	5	2.5	2162UB-6P1NKC-39	2.5	2162UB-6P1NJC-39	
3	9.0	7.5	2.5	2162UB-9P0NKC-40	3.0	2162UB-9P0NJC-40	
3	11	10.0	2.5	2162UB-011NKC-41	3.0	2162UB-011NJC-41	
3	17	15	2.5	2162UB-017NKC-42	3.5	2162UB-017NJC-42	
3	22	20	2.5	2162UB-022NKC-43	3.5	2162UB-022NJC-43	
4	27	25	3.0	2162UB-027NKC-44	4.0	2162UB-027NJC-44	
4	32	30	3.0	2162UB-032NKC-45	4.0	2162UB-032NJC-45	
5	41	40	6.0 x 20" W x 15" D	2162UB-041NKC-46	6.0 x 25" W x 15" D	2162UB-041NJC-46	
5	52	50	6.0 x 25" W x 15" D	2162UB-052NKC-47	6.0 x 25" W x 15" D	2162UB-052NJC-47	
6	63	60	6.0 x 25" W x 20" D	2162UB-063NKC-48(3)	6.0 x 25" W x 20" D	2162UB-063NJC-48(3)	
6	77	75	6.0 x 25" W x 20" D	2162UB-077NKC-49(3)	6.0 x 25" W x 20" D	2162UB-077NJC-49(3)	
6	99	100	6.0 x 25" W x 20" D	2162UB-099NKC-50(3)	6.0 x 30" W x 20" D	2162UB-099NJC-50(3)	
6	125	125	6.0 x 25" W x 20" D	2162UB-125NKC-51(3)	6.0 x 35" W x 20" D	2162UB-125NJC-51(3)	
6	144	150	6.0 x 30" W x 20" D	2162UB-144NKC-52(3)	na		

(1) The HP ratings shown are nominal values.
- Size PowerFlex 753 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed
- Do not use another size motor without verifying the suitability of the unit for that motor size
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

(2) The horsepower ratings shown are for reference only. Size PowerFlex 753 drive units according to the application and output ampere rating.

(3) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Units -- 2162U Combination PowerFlex 753 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V AC and 600V AC, Heavy Duty

- Heavy Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 150% for 60 seconds, 200% for 3 seconds.
- For specific drive applications refer to the PowerFlex 750 Series Programming Manual, publication 750-PM001.
- Basic configuration includes an appropriately sized control circuit transformer (for pilot lights and/or fans), door, and unit support pan.
- Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 753 AC drives are cULus (UL and C-UL listed) as motor overload protected devices.
- An external overload relay is not required for single motor applications.
- PowerFlex 753 AC drive units are not intended for use with single phase motors.
- Units with fusible disconnect switch do not include factory supplied/installed branch circuit/drive input fusing. Optional factory supplied/installed UL Class J branch circuit/drive input fusing is available. If fusing is not factory installed, UL Class J fuse clips will be provided, sized based on the fuse size that would be factory installed.
- Combination Unit Short Circuit Rating is 100 kA for 480V. See Table 320.
- Wiring is Type B. Control terminal block can accept maximum of one #12AWG wire or two #16 AWG wires.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing drive units at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom.
- Do not mount transformer units below drive units. Heat from transformer units can cause the drive to trip.
- HIM (Human Interface Module) selection is required. Select from Options section.
- Drive includes two 24V DC Digital Inputs, one 24V DC/115V AC Digital Input, one Digital (Form-C Relay) Output, and one Analog Output.
- An I/O option module is available to provide an additional 6 Digital Inputs (select either 24V DC or 115V AC option module), two Digital (Form-C Relay) Outputs, two Analog Inputs, and two Analog Outputs.

Table 211 - 2162U Combination PowerFlex 753 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V AC, Heavy Duty

Frame	Rating[1]	Nominal HP[2]	NEMA Type 1 and Type 1 w/ gasket		NEMA Type 12		Delivery Program
	HD	480V	Space Factor	Catalog Number	Space Factor	Catalog Number	
2	2.1	1	2.5	2162UB-2P1HKB-35	2.5	2162UB-2P1HJB-35	SC
2	3.0	1.5	2.5	2162UB-3P4HKB-36	2.5	2162UB-3P4HJB-36	
2	3.4	2	2.5	2162UB-3P4HKB-37	2.5	2162UB-3P4HJB-37	
2	5.0	3	2.5	2162UB-5P0HKB-38	2.5	2162UB-5P0HJB-38	
2	8.0	5	2.5	2162UB-8P0HKB-39	2.5	2162UB-8P0HJB-39	
2	11	7.5	2.5	2162UB-011HKB-40	2.5	2162UB-011HJB-40	
2	14	10	2.5	2162UB-022HKB-41	3.0	2162UB-022HJB-41	
3	22	15	2.5	2162UB-027HKB-42	3.5	2162UB-027HJB-42	
3	27	20	2.5	2162UB-034HKB-43	3.5	2162UB-034HJB-43	
3	34	25	3.0	2162UB-040HKB-44	3.5	2162UB-040HJB-44	
4	40	30	3.0	2162UB-052HKB-45	4.0	2162UB-052HJB-45	
4	52	40	3.0	2162UB-065HKB-46	4.0	2162UB-065HJB-46	
5	65	50	6.0 x 20" W x 15" D	2162UB-077HKB-47	6.0 x 25" W x 15" D	2162UB-077HJB-47	
5	77	60	6.0 x 25" W x 15" D	2162UB-096HKB-48	6.0 x 25" W x 15" D	2162UB-096HJB-48	
6	96	75	6.0 x 25" W x 20" D	2162UB-125HKB-49[3]	6.0 x 25" W x 20" D	2162UB-125HJB-49[3]	
6	125	100	6.0 x 25" W x 20" D	2162UB-156HKB-50[3]	6.0 x 30" W x 20" D	2162UB-156HJB-50[3]	
6	156	125	6.0 x 25" W x 20" D	2162UB-186HKB-51[3]	6.0 x 35" W x 20" D	2162UB-186HJB-51[3]	
6	186	150	6.0 x 30" W x 20" D	2162UB-248HKB-52[3]			

(1) The HP ratings shown are nominal values.
- Size PowerFlex 753 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed
- Do not use another size motor without verifying the suitability of the unit for that motor size
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 750 Series Programming Manual, 750-PM001

(2) The horsepower ratings shown are for reference only. Size PowerFlex 753 drive units according to the application and output ampere rating.

(3) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Table 212 - 2162U Combination PowerFlex 753 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 600V AC, Heavy Duty

Frame	Rating[1]	Nominal HP[2]	NEMA Type 1 and Type 1 w/ gasket		NEMA Type 12		Delivery Program
	HD	600 V	Space Factor	Catalog Number	Space Factor	Catalog Number	
3	0.9	0.5	2.5	2162UB-1P7HKC-33	2.5	2162UB-1P7HJC-33	PE
3	1.3	0.75	2.5	2162UB-2P7HKC-34	2.5	2162UB-2P7HJC-34	
3	1.7	1.0	2.5	2162UB-2P7HKC-35	2.5	2162UB-2P7HJC-35	
3	2.4	1.5	2.5	2162UB-3P9HKC-36	2.5	2162UB-3P9HJC-37	
3	2.7	2	2.5	2162UB-3P9HKC-37	2.5	2162UB-3P9HJC-37	
3	3.9	3	2.5	2162UB-6P1HKC-38	2.5	2162UB-6P1HJC-38	
3	6.1	5	2.5	2162UB-9P0HKC-39	3.0	2162UB-9P0HJC-39	
3	9	7.5	2.5	2162UB-011HKC-40	3.0	2162UB-011HJC-40	
3	11	10	2.5	2162UB-017HKC-41	3.5	2162UB-017HJC-41	
3	17	15	2.5	2162UB-022HKC-42	3.5	2162UB-022HJC-42	
4	22	20	3.0	2162UB-027HKC-43	4.0	2162UB-027HJC-43	
4	27	25	3.0	2162UB-032HKC-44	4.0	2162UB-032HJC-44	
5	32	30	6.0 x 20" W x 15" D	2162UB-041HKC-45	6.0 x 25" W x 15" D	2162UB-041HJC-45	
5	41	40	6.0 x 25" W x 15" D	2162UB-052HKC-46	6.0 x 25" W x 15" D	2162UB-052HJC-46	
6	52	50	6.0 x 25" W x 20" D	2162UB-063HKC-47[3]	6.0 x 25" W x 20" D	2162UB-063HJC-47[3]	
6	63	60	6.0 x 25" W x 20" D	2162UB-077HKC-48[3]	6.0 x 25" W x 20" D	2162UB-077HJC-48[3]	
6	77	75	6.0 x 25" W x 20" D	2162UB-099HKC-49[3]	6.0 x 30" W x 20" D	2162UB-099HJC-49[3]	
6	99	100	6.0 x 25" W x 20" D	2162UB-125HKC-50[3]	6.0 x 35" W x 20" D	2162UB-125HJC-50[3]	
6	125	125	6.0 x 30" W x 20" D	2162UB-144HKC-51[3]	na		

(1) The HP ratings shown are nominal values.
- Size PowerFlex 753 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed
- Do not use another size motor without verifying the suitability of the unit for that motor size
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 750 Series Programming Manual, 750-PM001

(2) The horsepower ratings shown are for reference only. Size PowerFlex 753 drive units according to the application and output ampere rating.

(3) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Units -- 2163U Combination PowerFlex 753 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 480V AC and 600V AC, Normal Duty

- Heavy Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds, 150% for 3 seconds.
- For specific drive applications refer to the PowerFlex 750 Series Programming Manual, publication 750-PM001.
- Basic configuration includes an appropriately sized control circuit transformer (for pilot lights and/or fans), door, and unit support pan.
- Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 753 AC drives are cULus (UL and C-UL listed) as motor overload protected devices.
- An external overload relay is not required for single motor applications.
- PowerFlex 753 AC drive units are not intended for use with single phase motors.
- Units with circuit breaker use thermal-magnetic trip unit and do not include factory supplied/installed drive input fusing. Optional factory supplied/installed UL Class J branch circuit/drive input fusing is available.
- See Table 320 for Combination Unit Short Circuit Ratings table.
- Wiring is Type B. Control terminal block can accept maximum of one #12AWG wire or two #16 AWG wires.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing drive units at the bottom of the section.
  When more than one drive unit is placed in a section, the drive unit with the highest rating should be located at the bottom.
- Do not mount transformer units below drive units. Heat from transformer units may cause the drive to trip.
- HIM (Human Interface Module) selection is required. Select from Options section.
- Drive includes two 24V DC Digital Inputs, one 24V DC/115V AC Digital Input, one Digital (Form-C Relay) Output, and one Analog Output.
- An I/O option module is available to provide an additional 6 Digital Inputs (select either 24V DC or 115V AC option module), two Digital (Form-C Relay) Outputs, two Analog Inputs, and two Analog Outputs.

Table 213 - 2163U Combination PowerFlex 753 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 480V AC, Normal Duty

Frame	Rating(1)	Nominal HP(2)	NEMA Type 1 and Type 1 w/ gasket(3)		NEMA Type 12(3)		Delivery Program
	ND	480V	Space Factor	Catalog Number	Space Factor	Catalog Number	
2	14	10	2.5	2163UB-014NKB-41___	2.5	2163UB-014NJB-41___	SC
2	22	15	2.5	2163UB-022NKB-42___	3.0	2163UB-022NJB-42___	
3	27	20	2.5	2163UB-027NKB-43___	3.5	2163UB-027NJB-43___	
3	34	25	2.5	2163UB-034NKB-44___	3.5	2163UB-034NJB-44___	
3	40	30	3.0	2163UB-040NKB-45___	3.5	2163UB-040NJB-45___	
4	52	40	3.0	2163UB-052NKB-46___	4.0	2163UB-052NJB-46___	
4	65	50	3.0	2163UB-065NKB-47___	4.0	2163UB-065NJB-47___	
5	77	60	6.0 x 20" W x 15" D	2163UB-077NKB-48___	6.0 x 25" W x 15" D	2163UB-077NJB-48___	
5	96	75	6.0 x 25" W x 15" D	2163UB-096NKB-49___	6.0 x 25" W x 15" D	2163UB-096NJB-49___	
6	125	100	6.0 x 25" W x 20" D	2163UB-125NKB-50___(4)	6.0 x 25" W x 20" D	2163UB-125NJB-50___(4)	
6	156	125	6.0 x 25" W x 20" D	2163UB-156NKB-51___(4)	6.0 x 30" W x 20" D	2163UB-156NJB-51___(4)	
6	186	150	6.0 x 25" W x 20" D	2163UB-186NKB-52___(4)	6.0 x 35" W x 20" D	2163UB-186NJB-52___(4)	
6	248	200	6.0 x 30" W x 20" D	2163UB-248NKB-54___(4)			

(1) The HP ratings shown are nominal values.
- Size PowerFlex 753 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to PowerFlex 750 Series Programming Manual, 750-PM001.

(2) The horsepower ratings shown are for reference only. Size PowerFlex 753 drive units according to the application and output ampere rating.

(3) The catalog numbers listed are not complete. Select the appropriate suffix from Table 279 to identify the circuit breaker type (for example, 2163UB-034NKB-44**THM**).

(4) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Table 214 - 2163U Combination PowerFlex 753 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 600V AC, Normal Duty

Frame	Rating[1]	Nominal HP[2]	NEMA Type 1 and Type 1 w/ gasket[3]		NEMA Type 12[3]		Delivery Program
	ND	600 V	Space Factor	Catalog Number	Space Factor	Catalog Number	
3	0.9	0.5	2.5	2163UB-1P7NKC-33____	2.5	2163UB-1P7NJC-33____	PE
3	1.3	0.75	2.5	2163UB-1P7NKC-34____	2.5	2163UB-1P7NJC-34____	
3	1.7	1	2.5	2163UB-1P7NKC-35____	2.5	2163UB-1P7NJC-35____	
3	2.4	1.5	2.5	2163UB-2P7NKC-36____	2.5	2163UB-2P7NJC-36____	
3	2.7	2.0	2.5	2163UB-2P7NKC-37____	2.5	2163UB-2P7NJC-37____	
3	3.9	3	2.5	2163UB-3P9NKC-38____	2.5	2163UB-3P9NJC-38____	
3	6.1	5	2.5	2163UB-6P1NKC-39____	2.5	2163UB-6P1NJC-39____	
3	9.0	7.5	2.5	2163UB-9P0NKC-40____	3.0	2163UB-9P0NJC-40____	
3	11	10.0	2.5	2163UB-011NKC-41____	3.0	2163UB-011NJC-41____	
3	17	15	2.5	2163UB-017NKC-42____	3.5	2163UB-017NJC-42____	
3	22	20	2.5	2163UB-022NKC-43____	3.5	2163UB-022NJC-43____	
4	27	25	3.0	2163UB-027NKC-44____	4.0	2163UB-027NJC-44____	
4	32	30	3.0	2163UB-032NKC-45____	4.0	2163UB-032NJC-45____	
5	41	40	6.0 x 20" W x 15" D	2163UB-041NKC-46____	6.0 x 25" W x 15" D	2163UB-041NJC-46____	
5	52	50	6.0 x 25" W x 15" D	2163UB-052NKC-47____	6.0 x 25" W x 15" D	2163UB-052NJC-47____	
6	63	60	6.0 x 25" W x 20" D	2163UB-063NKC-48____[4]	6.0 x 25" W x 20" D	2163UB-063NJC-48____[4]	
6	77	75	6.0 x 25" W x 20" D	2163UB-077NKC-49____[4]	6.0 x 25" W x 20" D	2163UB-077NJC-49____[4]	
6	99	100	6.0 x 25" W x 20" D	2163UB-099NKC-50____[4]	6.0 x 30" W x 20" D	2163UB-099NJC-50____[4]	
6	125	125	6.0 x 25" W x 20" D	2163UB-125NKC-51____[4]	6.0 x 35" W x 20" D	2163UB-125NJC-51____[4]	
6	144	150	6.0 x 30" W x 20" D	2163UB-144NKC-52____[4]	N/A		

(1) The HP ratings shown are nominal values.
- Size PowerFlex 753 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to PowerFlex 750 Series Programming Manual, 750-PM001.

(2) The horsepower ratings shown are for reference only. Size PowerFlex 753 drive units according to the application and output ampere rating.

(3) The catalog numbers listed are not complete. Select the appropriate suffix from Table 279 to identify the circuit breaker type (for example, 2163UB-034NKC-44**THM**).

(4) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Units -- 2163U Combination PowerFlex 753 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 480V AC and 600V AC, Heavy Duty

- Heavy Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 150% for 60 seconds, 200% for 3 seconds.
- For specific drive applications refer to the PowerFlex 750 Series Programming Manual, publication 750-PM001.
- Basic configuration includes an appropriately sized control circuit transformer (for pilot lights and/or fans), door, and unit support pan.
- Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 753 AC drives are cULus (UL and C-UL listed) as motor overload protected devices.
- An external overload relay is not required for single motor applications.
- PowerFlex 753 AC drive units are not intended for use with single phase motors.
- Units with circuit breaker use thermal-magnetic trip unit and do not include factory supplied/installed drive input fusing. Optional factory supplied/installed UL Class J branch circuit/drive input fusing is available.
- See Table 320 for Combination Unit Short Circuit Ratings table.
- Wiring is Type B. Control terminal block can accept maximum of one #12AWG wire or two #16 AWG wires.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing drive units at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom.
- Do not mount transformer units below drive units. Heat from transformer units can cause the drive to trip.
- HIM (Human Interface Module) selection is required. Select from Options section.
- Drive includes two 24V DC Digital Inputs, one 24V DC/115V AC Digital Input, one Digital (Form-C Relay) Output, and one Analog Output.

Table 215 - 2163U Combination PowerFlex 753 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 480V AC, Heavy Duty

Frame	Rating[1]	Nominal HP[2]	NEMA Type 1 and Type 1 w/ gasket[3]		NEMA Type 12[3]		Delivery Program
	HD	480V	Space Factor	Catalog Number	Space Factor	Catalog Number	
2	2.1	1	2.5	2163UB-2P1HKB-35___	2.5	2163UB-2P1HJB-35___	SC
2	3.0	1.5	2.5	2163UB-3P4HKB-36___	2.5	2163UB-3P4HJB-36___	
2	3.4	2	2.5	2163UB-3P4HKB-37___	2.5	2163UB-3P4HJB-37___	
2	5.0	3	2.5	2163UB-5P0HKB-38___	2.5	2163UB-5P0HJB-38___	
2	8.0	5	2.5	2163UB-8P0HKB-39___	2.5	2163UB-8P0HJB-39___	
2	11	7.5	2.5	2163UB-011HKB-40___	2.5	2163UB-011HJB-40___	
2	14	10	2.5	2163UB-022HKB-41___	3.0	2163UB-022HJB-41___	
3	22	15	2.5	2163UB-027HKB-42___	3.5	2163UB-027HJB-42___	
3	27	20	2.5	2163UB-034HKB-43___	3.5	2163UB-034HJB-43___	
3	34	25	3.0	2163UB-040HKB-44___	3.5	2163UB-040HJB-44___	
4	40	30	3.0	2163UB-052HKB-45___	4.0	2163UB-052HJB-45___	
4	52	40	3.0	2163UB-065HKB-46___	4.0	2163UB-065HJB-46___	
5	65	50	6.0 x 20" W x 15" D	2163UB-077HKB-47___	6.0 x 25" W x 15" D	2163UB-077HJB-47___	
5	77	60	6.0 x 25" W x 15" D	2163UB-096HKB-48___	6.0 x 25" W x 15" D	2163UB-096HJB-48___	
6	96	75	6.0 x 25" W x 20" D	2163UB-125HKB-49___[4]	6.0 x 25" W x 20" D	2163UB-125HJB-49___[4]	
6	124	100	6.0 x 25" W x 20" D	2163UB-156HKB-50___[4]	6.0 x 30" W x 20" D	2163UB-156HJB-50___[4]	
6	156	125	6.0 x 25" W x 20" D	2163UB-186HKB-51___[4]	6.0 x 35" W x 20" D	2163UB-186HJB-51___[4]	
6	186	150	6.0 x 30" W x 20" D	2163UB-248HKB-52___[4]			

(1) The HP ratings shown are nominal values.
- Size PowerFlex 753 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

(2) The horsepower ratings shown are for reference only. Size PowerFlex 753 drive units according to the application and output ampere rating.

(3) The catalog numbers listed are not complete. Select the appropriate suffix from Table 279 to identify the circuit breaker type (for example, 2163UB-034HKB-44**THM**)

(4) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Table 216 - 2163U Combination PowerFlex 753 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 600 V AC, Heavy Duty

Frame	Rating[1]	Nominal HP[2]	NEMA Type 1 and Type 1 w/ gasket[3]		NEMA Type 12[3]		Delivery Program
	HD	600 V	Space Factor	Catalog Number	Space Factor	Catalog Number	
3	0.9	0.5	2.5	2163UB-1P7HKC-33____	2.5	2163UB-1P7HJC-33____	PE
3	1.3	0.75	2.5	2163UB-2P7HKC-34____	2.5	2163UB-2P7HJC-34____	
3	1.7	1.0	2.5	2163UB-2P7HKC-35____	2.5	2163UB-2P7HJC-35____	
3	2.4	1.5	2.5	2163UB-3P9HKC-36____	2.5	2163UB-3P9HJC-36____	
3	2.7	2	2.5	2163UB-3P9HKC-37____	2.5	2163UB-3P9HJC-37____	
3	3.9	3	2.5	2163UB-6P1HKC-38____	2.5	2163UB-6P1HJC-38____	
3	6.1	5	2.5	2163UB-9P0HKC-39____	3.0	2163UB-9P0HJC-39____	
3	9	7.5	2.5	2163UB-011HKC-40____	3.0	2163UB-011HJC-40____	
3	11	10	2.5	2163UB-017HKC-41____	3.5	2163UB-017HJC-41____	
3	17	15	2.5	2163UB-022HKC-42____	3.5	2163UB-022HJC-42____	
4	22	20	3.0	2163UB-027HKC-43____	4.0	2163UB-027HJC-43____	
4	27	25	3.0	2163UB-032HKC-44____	4.0	2163UB-032HJC-44____	
5	32	30	6.0 x 20" W x 15" D	2163UB-041HKC-45____	6.0 x 25" W x 15" D	2163UB-041HJC-45____	
5	41	40	6.0 x 25" W x 15" D	2163UB-052HKC-46____	6.0 x 25" W x 15" D	2163UB-052HJC-46____	
6	52	50	6.0 x 25" W x 20" D	2163UB-063HKC-47____[4]	6.0 x 25" W x 20" D	2163UB-063HJC-47____[4]	
6	63	60	6.0 x 25" W x 20" D	2163UB-077HKC-48____[4]	6.0 x 25" W x 20" D	2163UB-077HJC-48____[4]	
6	77	75	6.0 x 25" W x 20" D	2163UB-099HKC-49____[4]	6.0 x 30" W x 20" D	2163UB-099HJC-49____[4]	
6	99	100	6.0 x 25" W x 20" D	2163UB-125HKC-50____[4]	6.0 x 35" W x 20" D	2163UB-125HJC-50____[4]	
6	125	125	6.0 x 30" W x 20" D	2163UB-144HKC-51____[4]	N/A		

(1) The HP ratings shown are nominal values.
- Size PowerFlex 753 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

(2) The horsepower ratings shown are for reference only. Size PowerFlex 753 drive units according to the application and output ampere rating.

(3) The catalog numbers listed are not complete. Select the appropriate suffix from Table 279 to identify the circuit breaker type (for example, 2163UB-034HKC-44**THM**).

(4) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Bulletin 2162V and 2163V PowerFlex 755 Drive

These combination variable frequency AC motor drive units are specifically designed for use in CENTERLINE motor control centers. Each unit contains a high performance, microprocessor-controlled, variable frequency AC drive and either a fusible disconnect switch or a circuit breaker.

They also:

- Include isolated logic and power.
- Include fans and venting where required. See page 363.
- Include internal electronic overload protection.
- Include control circuit transformer (CCT). The CCT is sized to provide power for all standard pilot devices and any required fans.
- Produce a three-phase, pulse width modulated (PWM) adjustable frequency output and voltage output for exceptional control of motor speed and torque.
- Are digitally programmable with access to mode programming, providing precise and repeatedly accurate set-up, control, and operation, and adaptability to handle a variety of applications.
- Have available 24V DC or 115V AC control voltages.
- A Human Interface Module (HIM) must be selected.
- Bulletin 2162V and 2163V use PowerFlex 755 drives.

IMPORTANT In 480V applications, UL Class J time delay fuses are optional for both branch circuit protection and drive input protection.
In 600V applications, UL Class J time delay fuses are required for both branch circuit protection and drive input protection.

Each unit is provided as a NEMA Wiring Class I, Type B-T unit with terminals mounted in the unit for connection of remote items such as pilot devices and input signals. For NEMA Type 3R and NEMA Type 4 enclosure construction, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Catalog Number Explanation - Bulletin 2162V and 2163V PowerFlex 755 Drive

Table 217 -

2162V	B	-	034N	K	B	-	44	-	14HA0
2163V	B	-	034N	K	B	-	44THM	-	14HA0
Bulletin Number	Wiring Type		PowerFlex 755 Nominal Output Current Rating	NEMA Enclosure Type	Line Voltage		Nominal Horsepower/kW and Circuit Breaker Type		Human Interface Module and Options

Code	Type
2162V	PowerFlex 755 Variable Frequency AC Drive with Fusible Disconnect
2163V	PowerFlex 755 Variable Frequency AC Drive with Circuit Breaker

Code	Wiring Type
B	Type B

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Line Voltage
B	480V
C	600V

Code	Nominal Horsepower/kW Code and Circuit Breaker Type
2162V-'33'	'33_' Nominal Horsepower/kW code. See Table 266 and Table 267.
2163V-'33THM'	'33' Nominal Horsepower/kW code. See Table 266 and Table 267. '___THM' Circuit Breaker Type. See table on page 322

Code	Human Interface Module and Options
	See options section beginning on page 285

Drive Size Code, Maximum Output Current Rating (Amperes) and Nominal HP and (kW)(1)																
Normal Duty Applications 480V Line Voltage				Normal Duty Applications 600V Line Voltage				Heavy Duty Applications 480V Line Voltage				Heavy Duty Applications 600V Line Voltage			
Code	Frame	Ratings	HP	Code	Frame	Ratings	HP	Code	Frame	Ratings	HP	Code	Frame	Ratings	HP
2P1H(2)	2	2.1	1	1P7N	3	0.9	0.5	2P1H	2	2.1	1	1P7H	3	0.9	0.5
3P4H(2)	2	3	1.5	1P7N	3	1.3	0.75	3P4H	2	3	1.5	2P7H	3	1.3	0.75
3P4H(2)	2	3.4	2	1P7N	3	1.7	1	3P4H	2	3.4	2	2P7H	3	1.7	1
5P0H(2)	2	5	3	2P7N	3	2.4	1.5	5P0H	2	5	3	3P9H	3	2.4	1.5
8P0H(2)	2	8	5	2P7N	3	2.7	2	8P0H	2	8	5	3P9H	3	2.7	2
011H(2)	2	11	7.5	3P9N	3	3.9	3	011H	2	11	7.5	6P1H	3	3.9	3
014N	2	14	10	6P1N	3	6.1	5	022H	2	14	10	9P0H	3	6.1	5
022N	2	22	15	9P0N	3	9	7.5	027H	3	22	15	011H	3	9	7.5
027N	3	27	20	011N	3	11	10	034H	3	27	20	017H	3	11	10
034N	3	34	25	017N	3	17	15	040H	3	34	25	022H	3	17	15
040N	3	40	30	022N	3	22	20	052H	4	40	30	027H	4	22	20
052N	4	52	40	027N	4	27	25	065H	4	52	40	032H	4	27	25
065N	4	65	50	032N	4	32	30	077H	5	65	50	041H	5	32	30
077N	5	77	60	041N	5	41	40	096H	5	77	60	052H	5	41	40
096N	5	96	75	052N	5	52	50	125H	6	96	75	063H	6	52	50
125N	6	125	100	063N	6	63	60	156H	6	125	100	077H	6	63	60
156N	6	156	125	077N	6	77	75	186H	6	150	125	099H	6	77	75
186N	6	186	150	099N	6	99	100	248H	6	186	150	125H	6	99	100
248N	6	248	200	125N	6	125	125					144H	6	125	125
				144N	6	144	150								

(1) The kW and HP ratings shown are for reference only. Size the PowerFlex 750 drive units according to the applications and output ampere rating.

(2) Drive comes pre-programmed for Heavy Duty Applications. Refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

Units -- 2162V Combination PowerFlex 755 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V AC and 600V AC, Normal Duty

- Normal Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds, 150% for 3 seconds.
- For specific drive applications refer to the PowerFlex 750 Series Programming Manual, publication 750-PM001.
- Basic configuration includes an appropriately sized control circuit transformer (for pilot lights and/or fans), door, and unit support pan.
- Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 755 AC drives are cULus (UL and C-UL listed) as motor overload protected devices.
- An external overload relay is not required for single motor applications.
- PowerFlex 755 AC drive units are not intended for use with single phase motors.
- Units with fusible disconnect switch do not include factory supplied/installed branch circuit/drive input fusing. Optional factory supplied/installed UL Class J branch circuit/drive input fusing is available. If fusing is not factory installed, UL Class J fuse clips will be provided, sized based on the fuse size that would be factory installed
- Combination Unit Short Circuit Rating is 100 kA for 480V. See Table 319.
- Wiring is Type B. Control terminal block can accept maximum of one #12 AWG wire or two #16 AWG wires.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing drive units at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom.
- Do not mount transformer units below drive units. Heat from transformer units can cause the drive to trip.
- HIM (Human Interface Module) selection is required. Select from Options section.
- Drive includes two 24V DC Digital Inputs, one 24V DC/115V AC Digital Input, one Digital (Form-C Relay) Output, and one Analog Output.
- An I/O option module is available to provide an additional 6 Digital Inputs (select either 24V DC or 115V AC option module), two Digital (Form-C Relay) Outputs, two Analog Inputs and two Analog Outputs.

Table 218 - 2162V Combination PowerFlex 755 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V AC, Normal Duty

Frame	Rating[1]	Nominal HP[3]	NEMA Type 1 and Type 1 w/ gasket		NEMA Type 12		Delivery Program
	ND	480V	Space Factor	Catalog Number	Space Factor	Catalog Number	
2	2.1[2]	1	2.5	2162VB-2P1HKB-35	2.5	2162VB-2P1HJB-35	SC
2	3.0[2]	1.5	2.5	2162VB-3P4HKB-36	2.5	2162VB-3P4HJB-36	
2	3.4[2]	2	2.5	2162VB-3P4HKB-37	2.5	2162VB-3P4HJB-37	
2	5.0[2]	3	2.5	2162VB-5P0HKB-38	2.5	2162VB-5P0HJB-38	
2	8.0[2]	5	2.5	2162VB-8P0HKB-39	2.5	2162VB-8P0HJB-39	
2	11[2]	7.5	2.5	2162VB-011HKB-40	2.5	2162VB-011HJB-40	
2	14	10	2.5	2162VB-014NKB-41	2.5	2162VB-014NJB-41	
2	22	15	2.5	2162VB-022NKB-42	3.0	2162VB-022NJB-42	
3	27	20	2.5	2162VB-027NKB-43	3.5	2162VB-027NJB-43	
3	34	25	2.5	2162VB-034NKB-44	3.5	2162VB-034NJB-44	
3	40	30	3.0	2162VB-040NKB-45	3.5	2162VB-040NJB-45	
4	52	40	3.0	2162VB-052NKB-46	4.0	2162VB-052NJB-46	
4	65	50	3.0	2162VB-065NKB-47	4.0	2162VB-065NJB-47	
5	77	60	6.0 x 20" W x 15" D	2162VB-077NKB-48	6.0 x 25" W x 15" D	2162VB-077NJB-48	
5	96	75	6.0 x 25" W x 15" D	2162VB-096NKB-49	6.0 x 25" W x 15" D	2162VB-096NJB-49	
6	125	100	6.0 x 25" W x 20" D	2162VB-125NKB-50[4]	6.0 x 25" W x 20" D	2162VB-125NJB-50[4]	
6	156	125	6.0 x 25" W x 20" D	2162VB-156NKB-51[4]	6.0 x 30" W x 20" D	2162VB-156NJB-51[4]	
6	186	150	6.0 x 25" W x 20" D	2162VB-186NKB-52[4]	6.0 x 35" W x 20" D	2162VB-186NJB-52[4]	
6	248	200	6.0 x 30" W x 20" D	2162VB-248NKB-54[4]			

(1) Size the PowerFlex 755 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

(2) Drive comes pre-programmed for Heavy Duty Applications. Refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

(3) The nominal horsepower ratings shown are for reference only. Size the PowerFlex 755 drive units according to the application and output ampere rating.

(4) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Table 219 - 2162V Combination PowerFlex 755 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 600 V AC, Normal Duty

Frame	Rating[1]	Nominal HP[2]	NEMA Type 1 and Type 1 w/ gasket		NEMA Type 12		Delivery Program
	ND	600 V	Space Factor	Catalog Number	Space Factor	Catalog Number	
3	0.9	0.50	2.5	2162VB-1P7NKC-33	2.5	2162VB-1P7NJC-33	PE
3	1.3	0.75	2.5	2162VB-1P7NKC-34	2.5	2162VB-1P7NJC-34	
3	1.7	1	2.5	2162VB-1P7NKC-35	2.5	2162VB-1P7NJC-35	
3	2.4	1.5	2.5	2162VB-2P7NKC-36	2.5	2162VB-2P7NJC-36	
3	2.7	2.0	2.5	2162VB-2P7NKC-37	2.5	2162VB-2P7NJC-37	
3	3.9	3	2.5	2162VB-3P9NKC-38	2.5	2162VB-3P9NJC-38	
3	6.1	5	2.5	2162VB-6P1NKC-39	2.5	2162VB-6P1NJC-39	
3	9.0	7.5	2.5	2162VB-9P0NKC-40	3.0	2162VB-9P0NJC-40	
3	11	10.0	2.5	2162VB-011NKC-41	3.0	2162VB-011NJC-41	
3	17	15	2.5	2162VB-017NKC-42	3.5	2162VB-017NJC-42	
3	22	20	2.5	2162VB-022NKC-43	3.5	2162VB-022NJC-43	
4	27	25	3.0	2162VB-027NKC-44	4.0	2162VB-027NJC-44	
4	32	30	3.0	2162VB-032NKC-45	4.0	2162VB-032NJC-45	
5	41	40	6.0 x 20" W x 15" D	2162VB-041NKC-46	6.0 x 25" W x 15" D	2162VB-041NJC-46	
5	52	50	6.0 x 25" W x 15" D	2162VB-052NKC-47	6.0 x 25" W x 15" D	2162VB-052NJC-47	
6	63	60	6.0 x 25" W x 20" D	2162VB-063NKC-48[3]	6.0 x 25" W x 20" D	2162VB-063NJC-48[3]	
6	77	75	6.0 x 25" W x 20" D	2162VB-077NKC-49[3]	6.0 x 25" W x 20" D	2162VB-077NJC-49[3]	
6	99	100	6.0 x 25" W x 20" D	2162VB-099NKC-50[3]	6.0 x 30" W x 20" D	2162VB-099NJC-50[3]	
6	125	125	6.0 x 25" W x 20" D	2162VB-125NKC-51[3]	6.0 x 35" W x 20" D	2162VB-125NJC-51[3]	
6	144	150	6.0 x 30" W x 20" D	2162VB-144NKC-52[3]	N/A		

(1) Size the PowerFlex 755 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

(2) The nominal horsepower ratings shown are for reference only. Size the PowerFlex 755 drive units according to the application and output ampere rating.

(3) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Units -- 2162V Combination PowerFlex 755 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V AC and 600V AC, Heavy Duty

- Heavy Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 150% for 60 seconds, 200% for 3 seconds.
- For specific drive applications refer to the PowerFlex 750 Series Programming Manual, publication 750-PM001.
- Basic configuration includes an appropriately sized control circuit transformer (for pilot lights and/or fans), door, and unit support pan.
- Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 755 AC drives are cULus (UL and C-UL listed) as motor overload protected devices.
- An external overload relay is not required for single motor applications.
- PowerFlex 755 AC drive units are not intended for use with single phase motors.
- Units with fusible disconnect switch do not include factory supplied/installed branch circuit/drive input fusing. Optional factory supplied/installed UL Class J branch circuit/drive input fusing is available. If fusing is not factory installed, UL Class J fuse clips will be provided, sized based on the fuse size that would be factory installed.
- Combination Unit Short Circuit Rating is 100 kA for 480V. See Table 320.
- Wiring is Type B. Control terminal block can accept maximum of one #12AWG wire or two #16 AWG wires.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing drive units at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom.
- Do not mount transformer units below drive units. Heat from transformer units can cause the drive to trip.
- HIM (Human Interface Module) selection is required. Select from Options section.
- Drive includes two 24V DC Digital Inputs, one 24V DC/115V AC Digital Input, one Digital (Form-C Relay) Output, and one Analog Output.
- An I/O option module is available to provide an additional 6 Digital Inputs (select either 24V DC or 115V AC option module), two Digital (Form-C Relay) Outputs, two Analog Inputs, and two Analog Outputs.

Table 220 - 2162V Combination PowerFlex 755 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V AC, Heavy Duty

Frame	Rating[1]	Nominal HP[2]	NEMA Type 1 and Type 1 w/ gasket		NEMA Type 12		Delivery Program
	HD	480V	Space Factor	Catalog Number	Space Factor	Catalog Number	
2	2.1	1	2.5	2162VB-2P1HKB-35	2.5	2162VB-2P1HJB-35	SC
2	3.0	1.5	2.5	2162VB-3P4HKB-36	2.5	2162VB-3P4HJB-36	
2	3.4	2	2.5	2162VB-3P4HKB-37	2.5	2162VB-3P4HJB-37	
2	5.0	3	2.5	2162VB-5P0HKB-38	2.5	2162VB-5P0HJB-38	
2	8.0	5	2.5	2162VB-8P0HKB-39	2.5	2162VB-8P0HJB-39	
2	11	7.5	2.5	2162VB-011HKB-40	2.5	2162VB-011HJB-40	
2	14	10	2.5	2162VB-022HKB-41	3.0	2162VB-022HJB-41	
3	22	15	2.5	2162VB-027HKB-42	3.5	2162VB-027HJB-42	
3	27	20	2.5	2162VB-034HKB-43	3.5	2162VB-034HJB-43	
3	34	25	3.0	2162VB-040HKB-44	3.5	2162VB-040HJB-44	
4	40	30	3.0	2162VB-052HKB-45	4.0	2162VB-052HJB-45	
4	52	40	3.0	2162VB-065HKB-46	4.0	2162VB-065HJB-46	
5	65	50	6.0 x 20" W x 15" D	2162VB-077HKB-47	6.0 x 25" W x 15" D	2162VB-077HJB-47	
5	77	60	6.0 x 25" W x 15" D	2162VB-096HKB-48	6.0 x 25" W x 15" D	2162VB-096HJB-48	
6	96	75	6.0 x 25" W x 20" D	2162VB-125HKB-49[3]	6.0 x 25" W x 20" D	2162VB-125HJB-49[3]	
6	125	100	6.0 x 25" W x 20" D	2162VB-156HKB-50[3]	6.0 x 30" W x 20" D	2162VB-156HJB-50[3]	
6	156	125	6.0 x 25" W x 20" D	2162VB-186HKB-51[3]	6.0 x 35" W x 20" D	2162VB-186HJB-51[3]	
6	186	150	6.0 x 30" W x 20" D	2162VB-248HKB-52[3]			

(1) Size the PowerFlex 755 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

(2) The nominal horsepower ratings shown are for reference only. Size the PowerFlex 755 drive units according to the application and output ampere rating.

(3) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Table 221 - 2162V Combination PowerFlex 755 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 600 V AC, Heavy Duty

Frame	Rating[1]	Nominal HP[2]	NEMA Type 1 and Type 1 w/ gasket		NEMA Type 12		Delivery Program
	HD	600 V	Space Factor	Catalog Number	Space Factor	Catalog Number	
3	0.9	0.5	2.5	2162VB-1P7HKC-33	2.5	2162VB-1P7HJC-33	PE
3	1.3	0.75	2.5	2162VB-2P7HKC-34	2.5	2162VB-2P7HJC-34	
3	1.7	1.0	2.5	2162VB-2P7HKC-35	2.5	2162VB-2P7HJC-35	
3	2.4	1.5	2.5	2162VB-3P9HKC-36	2.5	2162VB-3P9HJC-37	
3	2.7	2	2.5	2162VB-3P9HKC-37	2.5	2162VB-3P9HJC-37	
3	3.9	3	2.5	2162VB-6P1HKC-38	2.5	2162VB-6P1HJC-38	
3	6.1	5	2.5	2162VB-9P0HKC-39	3.0	2162VB-9P0HJC-39	
3	9	7.5	2.5	2162VB-011HKC-40	3.0	2162VB-011HJC-40	
3	11	10	2.5	2162VB-017HKC-41	3.5	2162VB-017HJC-41	
3	17	15	2.5	2162VB-022HKC-42	3.5	2162VB-022HJC-42	
4	22	20	3.0	2162VB-027HKC-43	4.0	2162VB-027HJC-43	
4	27	25	3.0	2162VB-032HKC-44	4.0	2162VB-032HJC-44	
5	32	30	6.0 x 20" W x 15" D	2162VB-041HKC-45	6.0 x 25" W x 15" D	2162VB-041HJC-45	
5	41	40	6.0 x 25" W x 15" D	2162VB-052HKC-46	6.0 x 25" W x 15" D	2162VB-052HJC-46	
6	52	50	6.0 x 25" W x 20" D	2162VB-063HKC-47[3]	6.0 x 25" W x 20" D	2162VB-063HJC-47[3]	
6	63	60	6.0 x 25" W x 20" D	2162VB-077HKC-48[3]	6.0 x 25" W x 20" D	2162VB-077HJC-48[3]	
6	77	75	6.0 x 25" W x 20" D	2162VB-099HKC-49[3]	6.0 x 30" W x 20" D	2162VB-099HJC-49[3]	
6	99	100	6.0 x 25" W x 20" D	2162VB-125HKC-50[3]	6.0 x 35" W x 20" D	2162VB-125HJC-50[3]	
6	125	125	6.0 x 30" W x 20" D	2162VB-144HKC-51[3]	N/A		

(1) Size the PowerFlex 755 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

(2) The nominal horsepower ratings shown are for reference only. Size the PowerFlex 755 drive units according to the application and output ampere rating.

(3) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Units -- 2163V Combination PowerFlex 755 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 480V AC and 600V AC, Normal Duty

- Heavy Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 110% for 60 seconds, 150% for 3 seconds.
- For specific drive applications refer to the PowerFlex 750 Series Programming Manual, publication 750-PM001.
- Basic configuration includes an appropriately sized control circuit transformer (for pilot lights and/or fans), door, and unit support pan.
- Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 755 AC drives are cULus (UL and C-UL listed) as motor overload protected devices.
- An external overload relay is not required for single motor applications.
- PowerFlex 755 AC drive units are not intended for use with single phase motors.
- Units with circuit breaker use thermal-magnetic trip unit and do not include factory supplied/installed drive input fusing. Optional factory supplied/installed UL Class J branch circuit/drive input fusing is available.
- See Table 320 for Combination Unit Short Circuit Ratings table.
- Wiring is Type B. Control terminal block can accept maximum of one #12AWG wire or two #16 AWG wires.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing drive units at the bottom of the section.
  When more than one drive unit is placed in a section, the drive unit with the highest rating should be located at the bottom.
- Do not mount transformer units below drive units. Heat from transformer units may cause the drive to trip.
- HIM (Human Interface Module) selection is required. Select from Options section.
- Drive includes two 24V DC Digital Inputs, one 24V DC/115V AC Digital Input, one Digital (Form-C Relay) Output, and one Analog Output.

An I/O option module is available to provide an additional 6 Digital Inputs (select either 24V DC or 115V AC option module), two Digital (Form-C Relay) Outputs, two Analog Inputs, and two Analog Outputs.

Table 222 - 2163V Combination PowerFlex 755 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 480V AC, Normal Duty

Frame	Rating[1]	Nominal HP[3]	NEMA Type 1 and Type 1 w/ gasket[4]		NEMA Type 12[3]		Delivery Program
	ND	480V	Space Factor	Catalog Number	Space Factor	Catalog Number	
2	2.1[2]	1	2.5	2163VB-2P1HKB-35___	2.5	2163VB-2P1HJB-35___	SC
2	3.0[2]	1.5	2.5	2163VB-3P4HKB-36___	2.5	2163VB-3P4HJB-36___	
2	3.4[2]	2	2.5	2163VB-3P4HKB-37___	2.5	2163VB-3P4HJB-37___	
2	5.0[2]	3	2.5	2163VB-5P0HKB-38___	2.5	2163VB-5P0HJB-38___	
2	8.0[2]	5	2.5	2163VB-8P0HKB-39___	2.5	2163VB-8P0HJB-39___	
2	11[2]	7.5	2.5	2163VB-011HKB-40___	2.5	2163VB-011HJB-40___	
2	14	10	2.5	2163VB-014NKB-41___	2.5	2163VB-014NJB-41___	
2	22	15	2.5	2163VB-022NKB-42___	3.0	2163VB-022NJB-42___	
3	27	20	2.5	2163VB-027NKB-43___	3.5	2163VB-027NJB-43___	
3	34	25	2.5	2163VB-034NKB-44___	3.5	2163VB-034NJB-44___	
3	40	30	3.0	2163VB-040NKB-45___	3.5	2163VB-040NJB-45___	
4	52	40	3.0	2163VB-052NKB-46___	4.0	2163VB-052NJB-46___	
4	65	50	3.0	2163VB-065NKB-47___	4.0	2163VB-065NJB-47___	
5	77	60	6.0 x 20" W x 15" D	2163VB-077NKB-48___	6.0 x 25" W x 15" D	2163VB-077NJB-48___	
5	96	75	6.0 x 25" W x 15" D	2163VB-096NKB-49___	6.0 x 25" W x 15" D	2163VB-096NJB-49___	
6	125	100	6.0 x 25" W x 20" D	2163VB-125NKB-50___[5]	6.0 x 25" W x 20" D	2163VB-125NJB-50___[5]	
6	156	125	6.0 x 25" W x 20" D	2163VB-156NKB-51___[5]	6.0 x 30" W x 20" D	2163VB-156NJB-51___[5]	
6	186	150	6.0 x 25" W x 20" D	2163VB-186NKB-52___[5]	6.0 x 35" W x 20" D	2163VB-186NJB-52___[5]	
6	248	200	6.0 x 30" W x 20" D	2163VB-248NKB-54___[5]			

(1) Size the PowerFlex 755 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

(2) Drive comes pre-programmed for Heavy Duty Applications. Refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

(3) The nominal horsepower ratings shown are for reference only. Size the PowerFlex 755 drive units according to the application and output ampere rating.

(4) The catalog numbers listed are not complete. Select the appropriate suffix from Table 279 to identify the circuit breaker type (for example, 2163VB-034NKB-44**THM**).

(5) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Table 223 - 2163V Combination PowerFlex 755 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 600 V AC, Normal Duty

Frame	Rating[1]	Nominal HP[2]	NEMA Type 1 and Type 1 w/ gasket[3]		NEMA Type 12[3]		Delivery Program
	ND	600 V	Space Factor	Catalog Number	Space Factor	Catalog Number	
3	0.9	0.5	2.5	2163VB-1P7NKC-33____	2.5	2163VB-1P7NJC-33____	PE
3	1.3	0.75	2.5	2163VB-1P7NKC-34____	2.5	2163VB-1P7NJC-34____	
3	1.7	1	2.5	2163VB-1P7NKC-35____	2.5	2163VB-1P7NJC-35____	
3	2.4	1.5	2.5	2163VB-2P7NKC-36____	2.5	2163VB-2P7NJC-36____	
3	2.7	2.0	2.5	2163VB-2P7NKC-37____	2.5	2163VB-2P7NJC-37____	
3	3.9	3	2.5	2163VB-3P9NKC-38____	2.5	2163VB-3P9NJC-38____	
3	6.1	5	2.5	2163VB-6P1NKC-39____	2.5	2163VB-6P1NJC-39____	
3	9.0	7.5	2.5	2163VB-9P0NKC-40____	3.0	2163VB-9P0NJC-40____	
3	11	10.0	2.5	2163VB-011NKC-41____	3.0	2163VB-011NJC-41____	
3	17	15	2.5	2163VB-017NKC-42____	3.5	2163VB-017NJC-42____	
3	22	20	2.5	2163VB-022NKC-43____	3.5	2163VB-022NJC-43____	
4	27	25	3.0	2163VB-027NKC-44____	4.0	2163VB-027NJC-44____	
4	32	30	3.0	2163VB-032NKC-45____	4.0	2163VB-032NJC-45____	
5	41	40	6.0 x 20" W x 15" D	2163VB-041NKC-46____	6.0 x 25" W x 15" D	2163VB-041NJC-46____	
5	52	50	6.0 x 25" W x 15" D	2163VB-052NKC-47____	6.0 x 25" W x 15" D	2163VB-052NJC-47____	
6	63	60	6.0 x 25" W x 20" D	2163VB-063NKC-48____[4]	6.0 x 25" W x 20" D	2163VB-063NJC-48____[4]	
6	77	75	6.0 x 25" W x 20" D	2163VB-077NKC-49____[4]	6.0 x 25" W x 20" D	2163VB-077NJC-49____[4]	
6	99	100	6.0 x 25" W x 20" D	2163VB-099NKC-50____[4]	6.0 x 30" W x 20" D	2163VB-099NJC-50____[4]	
6	125	125	6.0 x 25" W x 20" D	2163VB-125NKC-51____[4]	6.0 x 35" W x 20" D	2163VB-125NJC-51____[4]	
6	144	150	6.0 x 30" W x 20" D	2163VB-144NKC-52____[4]	N/A		

(1) Size the PowerFlex 755 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

(2) The nominal horsepower ratings shown are for reference only. Size the PowerFlex 755 drive units according to the application and output ampere rating.

(3) The catalog numbers listed are not complete. Select the appropriate suffix from Table 279 to identify the circuit breaker type (for example, 2163VB-034NKC-44**THM**).

(4) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Units -- 2163V Combination PowerFlex 755 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 480V AC and 600V AC, Heavy Duty

- Heavy Duty Ratings, the drive overload capabilities (based on the output currents listed below) are: 150% for 60 seconds, 200% for 3 seconds.
- For specific drive applications refer to the PowerFlex 750 Series Programming Manual, publication 750-PM001.
- Basic configuration includes an appropriately sized control circuit transformer (for pilot lights and/or fans), door, and unit support pan.
- Branch circuit overload protection is provided by the internal drive overload.
- PowerFlex 755 AC drives are cULus (UL and C-UL listed) as motor overload protected devices.
- An external overload relay is not required for single motor applications.
- PowerFlex 755 AC drive units are not intended for use with single phase motors.
- Units with circuit breaker use thermal-magnetic trip unit and do not include factory supplied/installed drive input fusing. Optional factory supplied/installed UL Class J branch circuit/drive input fusing is available.
- See Table 320 for Combination Unit Short Circuit Ratings table.
- Wiring is Type B. Control terminal block can accept maximum of one #12 AWG wire or two #16 AWG wires.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive.
  Give strong consideration to placing drive units at the bottom of the section.
  When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom.
- Do not mount transformer units below drive units. Heat from transformer units can cause the drive to trip.
- HIM (Human Interface Module) selection is required. Select from Options section.
- Drive includes two 24V DC Digital Inputs, one 24V DC/115V AC Digital Input, one Digital (Form-C Relay) Output, and one Analog Output.

Table 224 - 2163V Combination PowerFlex 755 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 480V AC, Heavy Duty

Frame	Rating[1]	Nominal HP[2]	NEMA Type 1 and Type 1 w/ gasket[3]		NEMA Type 12[3]		Delivery Program
	HD	480V	Space Factor	Catalog Number	Space Factor	Catalog Number	
2	2.1	1	2.5	2163VB-2P1HKB-35___	2.5	2163VB-2P1HJB-35___	SC
2	3.0	1.5	2.5	2163VB-3P4HKB-36___	2.5	2163VB-3P4HJB-36___	
2	3.4	2	2.5	2163VB-3P4HKB-37___	2.5	2163VB-3P4HJB-37___	
2	5.0	3	2.5	2163VB-5P0HKB-38___	2.5	2163VB-5P0HJB-38___	
2	8.0	5	2.5	2163VB-8P0HKB-39___	2.5	2163VB-8P0HJB-39___	
2	11	7.5	2.5	2163VB-011HKB-40___	2.5	2163VB-011HJB-40___	
2	14	10	2.5	2163VB-022HKB-41___	3.0	2163VB-022HJB-41___	
3	22	15	2.5	2163VB-027HKB-42___	3.5	2163VB-027HJB-42___	
3	27	20	2.5	2163VB-034HKB-43___	3.5	2163VB-034HJB-43___	
3	34	25	3.0	2163VB-040HKB-44___	3.5	2163VB-040HJB-44___	
4	40	30	3.0	2163VB-052HKB-45___	4.0	2163VB-052HJB-45___	
4	52	40	3.0	2163VB-065HKB-46___	4.0	2163VB-065HJB-46___	
5	65	50	6.0 x 20" W x 15" D	2163VB-077HKB-47___	6.0 x 25" W x 15" D	2163VB-077HJB-47___	
5	77	60	6.0 x 25" W x 15" D	2163VB-096HKB-48___	6.0 x 25" W x 15" D	2163VB-096HJB-48___	
6	96	75	6.0 x 25" W x 20" D	2163VB-125HKB-49___[4]	6.0 x 25" W x 20" D	2163VB-125HJB-49___[4]	
6	124	100	6.0 x 25" W x 20" D	2163VB-156HKB-50___[4]	6.0 x 30" W x 20" D	2163VB-156HJB-50___[4]	
6	156	125	6.0 x 25" W x 20" D	2163VB-186HKB-51___[4]	6.0 x 35" W x 20" D	2163VB-186HJB-51___[4]	
6	186	150	6.0 x 30" W x 20" D	2163VB-248HKB-52___[4]			

(1) Size the PowerFlex 755 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
- Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
- If carrier frequencies above these values are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

(2) The nominal horsepower ratings shown are for reference only. Size the PowerFlex 755 drive units according to the application and output ampere rating.

(3) The catalog numbers listed are not complete. Select the appropriate suffix from Table 279 to identify the circuit breaker type (for example, 2163VB-034HKB-44**THM**).

(4) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Table 225 - 2163V Combination PowerFlex 755 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 600 V AC, Heavy Duty

Frame	Rating[1]	Nominal HP[2]	NEMA Type 1 and Type 1 w/ gasket[3]		NEMA Type 12[3]		Delivery Program
	HD	600 V	Space Factor	Catalog Number	Space Factor	Catalog Number	
3	0.9	0.5	2.5	2163VB-1P7HKC-33____	2.5	2163VB-1P7HJC-33____	PE
3	1.3	0.75	2.5	2163VB-2P7HKC-34____	2.5	2163VB-2P7HJC-34____	
3	1.7	1.0	2.5	2163VB-2P7HKC-35____	2.5	2163VB-2P7HJC-35____	
3	2.4	1.5	2.5	2163VB-3P9HKC-36____	2.5	2163VB-3P9HJC-36____	
3	2.7	2	2.5	2163VB-3P9HKC-37____	2.5	2163VB-3P9HJC-37____	
3	3.9	3	2.5	2163VB-6P1HKC-38____	2.5	2163VB-6P1HJC-38____	
3	6.1	5	2.5	2163VB-9P0HKC-39____	3.0	2163VB-9P0HJC-39____	
3	9	7.5	2.5	2163VB-011HKC-40____	3.0	2163VB-011HJC-40____	
3	11	10	2.5	2163VB-017HKC-41____	3.5	2163VB-017HJC-41____	
3	17	15	2.5	2163VB-022HKC-42____	3.5	2163VB-022HJC-42____	
4	22	20	3.0	2163VB-027HKC-43____	4.0	2163VB-027HJC-43____	
4	27	25	3.0	2163VB-032HKC-44____	4.0	2163VB-032HJC-44____	
5	32	30	6.0 x 20" W x 15" D	2163VB-041HKC-45____	6.0 x 25" W x 15" D	2163VB-041HJC-45____	
5	41	40	6.0 x 25" W x 15" D	2163VB-052HKC-46____	6.0 x 25" W x 15" D	2163VB-052HJC-46____	
6	52	50	6.0 x 25" W x 20" D	2163VB-063HKC-47____[4]	6.0 x 25" W x 20" D	2163VB-063HJC-47____[4]	
6	63	60	6.0 x 25" W x 20" D	2163VB-077HKC-48____[4]	6.0 x 25" W x 20" D	2163VB-077HJC-48____[4]	
6	77	75	6.0 x 25" W x 20" D	2163VB-099HKC-49____[4]	6.0 x 30" W x 20" D	2163VB-099HJC-49____[4]	
6	99	100	6.0 x 25" W x 20" D	2163VB-125HKC-50____[4]	6.0 x 35" W x 20" D	2163VB-125HJC-50____[4]	
6	125	125	6.0 x 30" W x 20" D	2163VB-144HKC-51____[4]	na		

(1) Size the PowerFlex 755 drive units according to the application and output ampere rating.
Standard units are configured to properly protect only the nominal motor horsepower listed.
Do not use another size motor without verifying the suitability of the unit for that motor size.
Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
Heavy Duty Applications can allow 150% overload of listed output current for 60 seconds.
Ampere ratings are at a 4 kHz carrier frequency for Frame 3 and smaller.
Ampere ratings are at a 2 kHz carrier frequency for Frame 4 and larger.
If carrier frequencies above these values are selected, the drive output current ratings must be derated.
For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 750 Series Programming Manual, 750-PM001.

(2) The nominal horsepower ratings shown are for reference only. Size the PowerFlex 755 drive units according to the application and output ampere rating.

(3) The catalog numbers listed are not complete. Select the appropriate suffix from Table 279 to identify the circuit breaker type (for example, 2163VB-034HKC-44**THM**).

(4) Frame mounted unit, section does not have vertical wireway. Horizontal bus is 5 in. deeper than standard.

Bulletin 2162W and 2163W PowerFlex 525 Drive

These combination variable frequency AC motor drive units are specifically designed for use in CENTERLINE motor control centers. Each unit contains a high performance, microprocessor-controlled, variable frequency AC drive and either a fusible disconnect switch or a circuit breaker.

They also:

- Include isolated logic and power.
- Include fans and venting where required. See page 363.
- Require UL Class CC or J time delay fuses. These fuses provide both branch circuit protection and drive input protection. The drive input fuses are required in series with the circuit breaker in Bulletin 2163W units.
- Include control circuit transformer (CCT). The CCT is sized to provide power for all standard pilot devices and any required fans.
- Produce a three-phase, pulse width modulated (PWM) adjustable frequency output and voltage output for exceptional control of motor speed and torque.
- Are digitally programmable with access to mode programming, providing precise and repeatedly accurate setup, control and operation, and adaptability to handle a variety of applications.

Bulletin 2162W and 2163W use normal duty PowerFlex 525 drives.

Each unit is provided as a NEMA Wiring Class I, Type B unit with terminals mounted within the bucket for connection of items such as, remote pilot devices and input signals. For NEMA Type 3R and NEMA Type 4 enclosure construction, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Catalog Number Explanation - Bulletin 2162W and 2163W PowerFlex 525 Drive

- Bulletins 2162W and 2163W use PowerFlex 525 Drives
- Bulletins 2162W and 2163W are sized for Normal Duty applications
- NEMA Enclosure Type 1, Type 1 with gasket or Type 12 Enclosure Type
- UL Class CC or J time delay drive input fuses required both branch circuit and drive input protection, fuse class dependent on drive rating
- Isolated logic and power produces a three-phase, pulse-width-modulated (PWM) adjustable frequency output to vary motor speed

Table 226 -

2162W	B	-	6P0	K	B	-	38	-	14HBA0
2163W	B	-	6P0	K	B	-	38TGM	-	14HBA0
Bulletin Number	Wiring Type		PowerFlex 525 Maximum Output Current Rating	NEMA Enclosure Type	Line Voltage		Nominal Horsepower/kW and Circuit Breaker Type		Human Interface Module and Options

Code	Type
2162W	PowerFlex 525 Variable Frequency AC Drive with Fusible Disconnect
2163W	PowerFlex 525 Variable Frequency AC Drive with Circuit Breaker

Code	Wiring Type
B	Type B

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Line Voltage
B	480V
C	600V

Code	Nominal Horsepower/kW Code and Circuit Breaker Type
2162W-'38'	'38' Nominal Horsepower/kW code. See Table 266 and Table 267.
2163W-'38T_M'	'38_' Nominal Horsepower/kW code. See Table 266 and Table 267. '___TGM' Circuit Breaker Type. See table on page 322

Code	Human Interface Module and Options
See options section beginning on page 285	

Drive Size Code, Maximum Output Current Rating (Amperes) and Nominal HP and (kW)(1)							
480V Line Voltage				600V Line Voltage			
Code	Frame	Maximum Output Current (Amperes)	Nominal HP	Code	Frame	Maximum Output Current (Amperes)	HP
1P4	A	1.4	0.5	0P9	A	0.9	0.5
2P3	A	1.7	0.75	1P7	A	1.3	0.75
2P3	A	2.3	1	1P7	A	1.7	1
4P0	A	3	1.5	3P0	A	2.2	1.5
4P0	A	4	2	3P0	A	3	2
6P0	A	6	3	4P2	A	4.2	3
010	B	10.5	5	6P6	B	6.6	5
013	C	13	7.5	9P9	C	9.9	7.5
017	C	17	10	012	C	12	10
024	D	24	15	019	D	19	15
030	D	30	20	022	D	22	20

(1) The kW and HP ratings shown are for reference only. Size PowerFlex 525 drive units according to the applications and output ampere rating.

Units-2162W Combination PowerFlex 525 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V and 600V AC

- See page 273 for product description.
- For specific drive applications refer to PowerFlex 525 User Manual, publication 520-UM001.
- All PowerFlex ratings are Normal Duty.
- Bucket includes branch circuit (short circuit, 80VA control circuit transformer, door, and unit support pan. Branch circuit (overload) protection is provided by the internal drive overload.
- See Table 320 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type B only. Drive can only accept 16 AWG control wire.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive. Give strong consideration to placing units with drives at the bottom of the section. When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- Integrated HIM (Human Interface Module) is included. Door mounted HIM must be selected on page 288.
- PowerFlex 525 AC drives are cULus (UL and C-UL listed) as motor overload protective devices. An external overload relay is not required for single motor applications. PowerFlex 525 AC drives are not intended for use with single phase motors.

Table 227 - 2162W Combination PowerFlex 525 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V AC, Normal Duty

Frame	Rating(1)	Nominal HP(2)	NEMA Type 1 and Type 1 w/gasket		NEMA 12		Delivery Program
		480V	Space Factor(3)	Catalog Number	Space Factor(3)	Catalog Number	
A	1.4	0.5	1.0	2162WB-1P4KB-33	1.5	2162WB-1P4JB-33	SC
A	1.7	0.75	1.0	2162WB-2P3KB-34	1.5	2162WB-2P3JB-34	
A	2.3	1.0	1.0	2162WB-2P3KB-35	1.5	2162WB-2P3JB-35	
A	3.0	1.5	1.0	2162WB-4P0KB-36	2.0	2162WB-4P0JB-36	
A	4.0	2.0	1.0	2162WB-4P0KB-37	2.0	2162WB-4P0JB-37	
A	6.0	3.0	1.0	2162WB-6P0KB-38	2.0	2162WB-6P0JB-38	
B	10.5	5.0	1.0	2162WB-010KB-39	2.0	2162WB-010JB-39	
C	13	7.5	2.0	2162WB-013KB-40	2.5	2162WB-013JB-40	
C	17	10	2.0	2162WB-017KB-41	2.5	2162WB-017JB-41	
D	24	15	2.0	2162WB-024KB-42	3.0	2162WB-024JB-42	
D	30	20	2.5	2162WB-030KB-43	3.5	2162WB-030JB-43	

(1) PowerFlex 525 drive units should be sized according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency.
- If carrier frequencies above 4 kHz are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 520 User Manual, publication 520-UM001.

(2) The nominal horsepower ratings shown are for reference only. PowerFlex 525 drive units should be sized according to the application and output ampere rating.

(3) Adding options to catalog string can increase space factor.

Table 228 - 2162W Combination PowerFlex 525 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 600V AC, Normal Duty

Frame	Rating(1)	Nominal HP(2)	NEMA Type 1 and Type 1 w/gasket		NEMA 12		Delivery Program
		600V	Space Factor(3)	Catalog Number	Space Factor(3)	Catalog Number	
A	0.9	0.5	1.0	2162WB-0P9KC-33	1.5	2162WB-0P9JC-33	SC
A	1.3	0.75	1.0	2162WB-1P7KC-34	1.5	2162WB-1P7JC-34	
A	1.7	1.0	1.0	2162WB-1P7KC-35	1.5	2162WB-1P7JC-35	
A	2.2	1.5	1.0	2162WB-3P0KC-36	2.0	2162WB-3P0JC-36	
A	3.0	2.0	1.0	2162WB-3P0KC-37	2.0	2162WB-3P0JC-37	
A	4.2	3.0	1.0	2162WB-4P2KC-38	2.0	2162WB-4P2JC-38	
B	6.6	5.0	1.0	2162WB-6P6KC-39	2.0	2162WB-6P6JC-39	
C	9.9	7.5	2.0	2162WB-9P9KC-40	2.5	2162WB-9P9JC-40	
C	12	10	2.0	2162WB-012KC-41	2.5	2162WB-012JC-41	
D	19	15	2.0	2162WB-019KC-42	3.0	2162WB-019JC-42	
D	22	20	2.5	2162WB-022KC-43	3.5	2162WB-022JC-43	

(1) PowerFlex 525 drive units should be sized according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency.
- If carrier frequencies above 4 kHz are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 520 User Manual, publication 520-UM001.

(2) The nominal horsepower ratings shown are for reference only. PowerFlex 525 drive units should be sized according to the application and output ampere rating.

(3) Adding options to catalog string can increase space factor.

Units-2163W Combination PowerFlex 525 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 480V and 600V AC

- See page 273 for product description.
- For specific drive applications refer to PowerFlex 525 User Manual, publication 520-UM001.
- All PowerFlex ratings are Normal Duty.
- Bucket includes branch circuit (short circuit, 80VA control circuit transformer, door, and unit support pan. Branch circuit (overload) protection is provided by the internal drive overload.
- See Table 320 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type B only. Drive can only accept 16 AWG control wire.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive. Give strong consideration to placing units with drives at the bottom of the section. When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- Integrated HIM (Human Interface Module) is included. Door mounted HIM must be selected on page 288.
- PowerFlex 525 AC drives are cULus (UL and C-UL listed) as motor overload protective devices. An external overload relay is not required for single motor applications. PowerFlex 525 AC drives are not intended for use with single phase motors.

Table 229 - 2163W Combination PowerFlex 525 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 480V AC, Normal Duty

Frame	Rating(1)	Nominal HP(2)	NEMA Type 1 and Type 1 w/gasket		NEMA 12		Delivery Program
		480V	Space Factor(3)	Catalog Number(4)	Space Factor(3)	Catalog Number(4)	
A	1.4	0.5	1.0	2163WB-1P4KB-33____	1.5	2163WB-1P4JB-33____	SC
A	1.7	0.75	1.0	2163WB-2P3KB-34____	1.5	2163WB-2P3JB-34____	
A	2.3	1.0	1.0	2163WB-2P3KB-35____	1.5	2163WB-2P3JB-35____	
A	3.0	1.5	1.0	2163WB-4P0KB-36____	2.0	2163WB-4P0JB-36____	
A	4.0	2.0	1.0	2163WB-4P0KB-37____	2.0	2163WB-4P0JB-37____	
A	6.0	3.0	1.0	2163WB-6P0KB-38____	2.0	2163WB-6P0JB-38____	
B	10.5	5.0	1.0	2163WB-010KB-39____	2.0	2163WB-010JB-39____	
C	13	7.5	2.0	2163WB-013KB-40____	2.5	2163WB-013JB-40____	
C	17	10	2.0	2163WB-017KB-41____	2.5	2163WB-017JB-41____	
D	24	15	2.0	2163WB-024KB-42____	3.0	2163WB-024JB-42____	
D	30	20	2.5	2163WB-030KB-43____	3.5	2163WB-030JB-43____	

(1) PowerFlex 525 drive units should be sized according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency.
- If carrier frequencies above 4 kHz are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 520 User Manual, publication 520-UM001.

(2) The nominal horsepower ratings shown are for reference only. PowerFlex 525 drive units should be sized according to the application and output ampere rating.

(3) Adding options to catalog string can increase space factor.

(4) The catalog numbers listed are not complete. Select the appropriate suffix from Table 279 to identify the circuit breaker type (for example, 2163WB-1P4KB-33TGM).

Table 230 - 2163W Combination PowerFlex 525 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 600V AC, Normal Duty

Frame	Rating(1)	Nominal HP(2)	NEMA Type 1 and Type 1 w/gasket		NEMA 12		Delivery Program
		600V	Space Factor(3)	Catalog Number(4)	Space Factor(3)	Catalog Number(4)	
A	0.9	0.5	1.0	2163WB-0P9KC-33____	1.5	2163WB-0P9JC-33____	SC
A	1.3	0.75	1.0	2163WB-1P7KC-34____	1.5	2163WB-1P7JC-34____	
A	1.7	1.0	1.0	2163WB-1P7KC-35____	1.5	2163WB-1P7JC-35____	
A	2.2	1.5	1.0	2163WB-3P0KC-36____	2.0	2163WB-3P0JC-36____	
A	3.0	2.0	1.0	2163WB-3P0KC-37____	2.0	2163WB-3P0JC-37____	
A	4.2	3.0	1.0	2163WB-4P2KC-38____	2.0	2163WB-4P2JC-38____	
B	6.6	5.0	1.0	2163WB-6P6KC-39____	2.0	2163WB-6P6JC-39____	
C	9.9	7.5	2.0	2163WB-9P9KC-40____	2.5	2163WB-9P9JC-40____	
C	12	10	2.0	2163WB-012KC-41____	2.5	2163WB-012JC-41____	
D	19	15	2.0	2163WB-019KC-42____	3.0	2163WB-019JC-42____	
D	22	20	2.5	2163WB-022KC-43____	3.5	2163WB-022JC-43____	

(1) PowerFlex 525 drive units should be sized according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency.
- If carrier frequencies above 4 kHz are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 520 User Manual, publication 520-UM001.

(2) The nominal horsepower ratings shown are for reference only. PowerFlex 525 drive units should be sized according to the application and output ampere rating.

(3) Adding options to catalog string can increase space factor.

(4) The catalog numbers listed are not complete. Select the appropriate suffix from Table 279 to identify the circuit breaker type (for example, 2163WB-1P4KB-33TGM).

Bulletin 2162X and 2163X PowerFlex 523 Drive

These combination variable frequency AC motor drive units are specifically designed for use in CENTERLINE motor control centers. Each unit contains a high performance, microprocessor-controlled, variable frequency AC drive and either a fusible disconnect switch or a circuit breaker.

They also:

- Include isolated logic and power.
- Include fans and venting where required. See page 363.
- Require UL Class CC or J time delay fuses. These fuses provide both branch circuit protection and drive input protection. The drive input fuses are required in series with the circuit breaker in Bulletin 2163X units.
- Include control circuit transformer (CCT). The CCT is sized to provide power for all standard pilot devices and any required fans.
- Produce a three-phase, pulse width modulated (PWM) adjustable frequency output and voltage output for exceptional control of motor speed and torque.
- Are digitally programmable with access to mode programming, providing precise and repeatedly accurate setup, control and operation, and adaptability to handle a variety of applications.

Bulletin 2162X and 2163X use normal duty PowerFlex 523 drives.

Each unit is provided as a NEMA Wiring Class I, Type B unit with terminals mounted within the bucket for connection of items such as, remote pilot devices and input signals. For NEMA Type 3R and NEMA Type 4 enclosure construction, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Catalog Number Explanation - Bulletin 2162X and 2163X PowerFlex 523 Drive

- Bulletins 2162X and 2163X use PowerFlex 523 Drives
- Bulletins 2162X and 2163X are sized for Normal Duty applications
- NEMA Enclosure Type 1, Type 1 with gasket or Type 12 Enclosure Type
- UL Class CC or J time delay drive input fuses required both branch circuit and drive input protection, fuse class dependent on drive rating
- Isolated logic and power produces a three-phase, pulse-width-modulated (PWM) adjustable frequency output to vary motor speed

Table 231 -

2162X	B	-	6P0	K	B	-	38	-	14HBA0
2163X	B	-	6P0	K	B	-	38TGM	-	14HBA0
Bulletin Number	Wiring Type		PowerFlex 525 Maximum Output Current Rating	NEMA Enclosure Type	Line Voltage		Nominal Horsepower/kW and Circuit Breaker Type		Human Interface Module and Options

Code	Type
2162X	PowerFlex 523 Variable Frequency AC Drive with Fusible Disconnect
2163X	PowerFlex 523 Variable Frequency AC Drive with Circuit Breaker

Code	Wiring Type
B	Type B

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Line Voltage
B	480V
C	600V

Code	Nominal Horsepower/kW Code and Circuit Breaker Type
2162X-'38'	'38' Nominal Horsepower/kW code. See Table 266 and Table 267.
2163X-'38T_M'	'38_' Nominal Horsepower/kW code. See Table 266 and Table 267. '___TGM' Circuit Breaker Type. See table on page 322

Code	Human Interface Module and Options
See options section beginning on page 285	

Drive Size Code, Maximum Output Current Rating (Amperes) and Nominal HP and (kW)(1)							
480V Line Voltage				600V Line Voltage			
Code	Frame	Maximum Output Current (Amperes)	Nominal HP	Code	Frame	Maximum Output Current (Amperes)	HP
1P4	A	1.4	0.5	0P9	A	0.9	0.5
2P3	A	1.7	0.75	1P7	A	1.3	0.75
2P3	A	2.3	1	1P7	A	1.7	1
4P0	A	3	1.5	3P0	A	2.2	1.5
4P0	A	4	2	3P0	A	3	2
6P0	A	6	3	4P2	A	4.2	3
010	B	10.5	5	6P6	B	6.6	5
013	C	13	7.5	9P9	C	9.9	7.5
017	C	17	10	012	C	12	10
024	D	24	15	019	D	19	15
030	D	30	20	022	D	22	20

(1) The kW and HP ratings shown are for reference only. Size PowerFlex 525 drive units according to the applications and output ampere rating.

Units-2162X Combination PowerFlex 523 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V and 600V AC

- See page 279 for product description.
- For specific drive applications refer to PowerFlex 523 User Manual, publication 520-UM001.
- All PowerFlex ratings are Normal Duty.
- Bucket includes branch circuit (short circuit, 80VA control circuit transformer, door, and unit support pan. Branch circuit (overload) protection is provided by the internal drive overload.
- See Table 320 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type B only. Drive can only accept 16 AWG control wire.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive. Give strong consideration to placing units with drives at the bottom of the section. When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- Integrated HIM (Human Interface Module) is included. Door mounted HIM must be selected on page 288.
- PowerFlex 523 AC drives are cULus (UL and C-UL listed) as motor overload protective devices. An external overload relay is not required for single motor applications. PowerFlex 523 AC drives are not intended for use with single phase motors.

Table 232 - 2162X Combination PowerFlex 523 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 480V AC, Normal Duty

Frame	Rating(1)	Nominal HP(2)	NEMA Type 1 and Type 1 w/gasket		NEMA 12		Delivery Program
		480V	Space Factor(3)	Catalog Number	Space Factor(3)	Catalog Number	
A	1.4	0.5	1.0	2162XB-1P4KB-33	1.5	2162XB-1P4JB-33	SC
A	1.7	0.75	1.0	2162XB-2P3KB-34	1.5	2162XB-2P3JB-34	
A	2.3	1.0	1.0	2162XB-2P3KB-35	1.5	2162XB-2P3JB-35	
A	3.0	1.5	1.0	2162XB-4P0KB-36	2.0	2162XB-4P0JB-36	
A	4.0	2.0	1.0	2162XB-4P0KB-37	2.0	2162XB-4P0JB-37	
A	6.0	3.0	1.0	2162XB-6P0KB-38	2.0	2162XB-6P0JB-38	
B	10.5	5.0	1.0	2162XB-010KB-39	2.0	2162XB-010JB-39	
C	13	7.5	2.0	2162XB-013KB-40	2.5	2162XB-013JB-40	
C	17	10	2.0	2162XB-017KB-41	2.5	2162XB-017JB-41	
D	24	15	2.0	2162XB-024KB-42	3.0	2162XB-024JB-42	
D	30	20	2.5	2162XB-030KB-43	3.5	2162XB-030JB-43	

(1) Size the PowerFlex 523 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency.
- If carrier frequencies above 4 kHz are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 520 User Manual, publication 520-UM001.

(2) The nominal horsepower ratings shown are for reference only. PowerFlex 523 drive units should be sized according to the application and output ampere rating.

(3) Adding options to catalog string can increase space factor.

Table 233 - 2162X Combination PowerFlex 523 Variable Frequency AC Drive (VFD) Units with Fusible Disconnect, 600V AC, Normal Duty

Frame	Rating(1)	Nominal HP(2)	NEMA Type 1 and Type 1 w/gasket		NEMA 12		Delivery Program
		600V	Space Factor(3)	Catalog Number	Space Factor(3)	Catalog Number	
A	0.9	0.5	1.0	2162XB-0P9KC-33	1.5	2162XB-0P9JC-33	SC
A	1.3	0.75	1.0	2162XB-1P7KC-34	1.5	2162XB-1P7JC-34	
A	1.7	1.0	1.0	2162XB-1P7KC-35	1.5	2162XB-1P7JC-35	
A	2.2	1.5	1.0	2162XB-3P0KC-36	2.0	2162XB-3P0JC-36	
A	3.0	2.0	1.0	2162XB-3P0KC-37	2.0	2162XB-3P0JC-37	
A	4.2	3.0	1.0	2162XB-4P2KC-38	2.0	2162XB-4P2JC-38	
B	6.6	5.0	1.0	2162XB-6P6KC-39	2.0	2162XB-6P6JC-39	
C	9.9	7.5	2.0	2162XB-9P9KC-40	2.5	2162XB-9P9JC-40	
C	12	10	2.0	2162XB-012KC-41	2.5	2162XB-012JC-41	
D	19	15	2.0	2162XB-019KC-42	3.0	2162XB-019JC-42	
D	22	20	2.5	2162XB-022KC-43	3.5	2162XB-022JC-43	

(1) Size the PowerFlex 523 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency.
- If carrier frequencies above 4 kHz are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 520 User Manual, publication 520-UM001.

(2) The nominal horsepower ratings shown are for reference only. PowerFlex 523 drive units should be sized according to the application and output ampere rating.

(3) Adding options to catalog string may increase space factor.

Units-2163X Combination PowerFlex 523 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 480V and 600V AC

- See page page 279 for product description.
- For specific drive applications refer to PowerFlex 523 User Manual, publication 520-UM001.
- All PowerFlex ratings are Normal Duty.
- Bucket includes branch circuit (short circuit, 80VA control circuit transformer, door, and unit support pan. Branch circuit (overload) protection is provided by the internal drive overload.
- See Table 320 for Combination Unit Short Circuit Withstand Ratings table.
- Wiring is Type B only. Drive can only accept 16 AWG control wire.
- Proper placement of drive units in the MCC is essential for proper operation and life cycle of the drive. Give strong consideration to placing units with drives at the bottom of the section. When more than one drive unit is placed in a section, locate the drive unit with the highest rating at the bottom of the section.
- Do not mount transformer units below drive units. Heat from transformer units can cause drive to trip.
- Integrated HIM (Human Interface Module) is included. Door mounted HIM must be selected on page 288.
- PowerFlex 523 AC drives are cULus (UL and C-UL listed) as motor overload protective devices. An external overload relay is not required for single motor applications. PowerFlex 523 AC drives are not intended for use with single phase motors.

Table 234 - 2163X Combination PowerFlex 523 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 480V AC, Normal Duty

Frame	Rating(1)	Nominal HP(2)	NEMA Type 1 and Type 1 w/gasket		NEMA 12		Delivery Program
		480V	Space Factor(3)	Catalog Number(4)	Space Factor(3)	Catalog Number(4)	
A	1.4	0.5	1.0	2163XB-1P4KB-33____	1.5	2163XB-1P4JB-33____	SC
A	1.7	0.75	1.0	2163XB-2P3KB-34____	1.5	2163XB-2P3JB-34____	
A	2.3	1.0	1.0	2163XB-2P3KB-35____	1.5	2163XB-2P3JB-35____	
A	3.0	1.5	1.0	2163XB-4P0KB-36____	2.0	2163XB-4P0JB-36____	
A	4.0	2.0	1.0	2163XB-4P0KB-37____	2.0	2163XB-4P0JB-37____	
A	6.0	3.0	1.0	2163XB-6P0KB-38____	2.0	2163XB-6P0JB-38____	
B	10.5	5.0	1.0	2163XB-010KB-39____	2.0	2163XB-010JB-39____	
C	13	7.5	2.0	2163XB-013KB-40____	2.5	2163XB-013JB-40____	
C	17	10	2.0	2163XB-017KB-41____	2.5	2163XB-017JB-41____	
D	24	15	2.0	2163XB-024KB-42____	3.0	2163XB-024JB-42____	
D	30	20	2.5	2163XB-030KB-43____	3.5	2163XB-030JB-43____	

(1) Size the PowerFlex 523 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency.
- If carrier frequencies above 4 kHz are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 520 User Manual, publication 520-UM001.

(2) The nominal horsepower ratings shown are for reference only. PowerFlex 523 drive units should be sized according to the application and output ampere rating.

(3) Adding options to catalog string can increase space factor.

(4) The catalog numbers listed are not complete. Select the appropriate suffix from Table 279 to identify the circuit breaker type (for example, 2163XB-1P4KB-33TGM).

Table 235 - 2163X Combination PowerFlex 523 Variable Frequency AC Drive (VFD) Units with Circuit Breaker, 600V AC, Normal Duty

Frame	Rating(1)	Nominal HP(2)	NEMA Type 1 and Type 1 w/gasket		NEMA 12		Delivery Program
		600V	Space Factor(3)	Catalog Number(4)	Space Factor(3)	Catalog Number(4)	
A	0.9	0.5	1.0	2163XB-0P9KC-33____	1.5	2163XB-0P9JC-33____	SC
A	1.3	0.75	1.0	2163XB-1P7KC-34____	1.5	2163XB-1P7JC-34____	
A	1.7	1.0	1.0	2163XB-1P7KC-35____	1.5	2163XB-1P7JC-35____	
A	2.2	1.5	1.0	2163XB-3P0KC-36____	2.0	2163XB-3P0JC-36____	
A	3.0	2.0	1.0	2163XB-3P0KC-37____	2.0	2163XB-3P0JC-37____	
A	4.2	3.0	1.0	2163XB-4P2KC-38____	2.0	2163XB-4P2JC-38____	
B	6.6	5.0	1.0	2163XB-6P6KC-39____	2.0	2163XB-6P6JC-39____	
C	9.9	7.5	2.0	2163XB-9P9KC-40____	2.5	2163XB-9P9JC-40____	
C	12	10	2.0	2163XB-012KC-41____	2.5	2163XB-012JC-41____	
D	19	15	2.0	2163XB-019KC-42____	3.0	2163XB-019JC-42____	
D	22	20	2.5	2163XB-022KC-43____	3.5	2163XB-022JC-43____	

(1) Size the PowerFlex 523 drive units according to the application and output ampere rating.
- Standard units are configured to properly protect only the nominal motor horsepower listed.
- Do not use another size motor without verifying the suitability of the unit for that motor size.
- Normal Duty Applications can allow 110% overload of listed output current for 60 seconds.
- Ampere ratings are at a 4 kHz carrier frequency.
- If carrier frequencies above 4 kHz are selected, the drive output current ratings must be derated.
- For derating information, contact your local Allen-Bradley distributor or Rockwell Automation sales representative and/or refer to the PowerFlex 520 User Manual, publication 520-UM001.

(2) The nominal horsepower ratings shown are for reference only. PowerFlex 523 drive units should be sized according to the application and output ampere rating.

(3) Adding options to catalog string can increase space factor.

(4) The catalog numbers listed are not complete. Select the appropriate suffix from Table 279 to identify the circuit breaker type (for example, 2163XB-1P4KB-33TGM).

Factory-Installed Options, Modifications, Accessories for Combination Variable Frequency AC Motor Drive Units

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

To select pilot light lens color, add letters to the option number: A = amber, B = blue, C = clear, G = green, R = red, W = white (for example, 4RG is a red ON and green OFF pilot light). Clear and white are not available for Bulletin 800T LED type pilot lights. Clear is not available on Bulletin 800F LED pilot lights. White is not available on Bulletin 800F incandescent pilot lights.

Table 236 - Bulletins 2162…2163 VFD Push Button, Control Station Housing, and Selector Switch Options

Option	Description		PowerFlex 40, 70, 520, 700, and 750 Series Drives						Option Number	Delivery Program
			2162Q 2162R 2163Q 2163R	2162T 2163T	2162W 2163W (8)	2162X 2163X (8)	2162U 2163U (8)	2162V 2163V (8) (11)		
Push Buttons (1), (2), (3)	DRIVE START–DRIVE STOP		✓(4)	✓(5)					-1	SC
	JOG		✓(4)						-1E	
Push Buttons and Selector Switch (1)	HAND-OFF-AUTO, HAND START-HAND STOP								-1F	
Selector Switch (1), (2), (3)	AUTO–MANUAL (speed select)		✓(4)	✓(5)					-3	
	FORWARD–REVERSE		✓(4)						-3E	
	HAND–OFF–AUTO		✓(4)	✓(5)	✓(6), (9)	✓(9)	✓(9)	✓(12)	-3F	
Pilot Lights (Transformer Type for 800T, full voltage 800F) (1), (3)	Standard type	RUN	✓	✓			✓(10)		-4_	
		RUN-AT SPEED	✓				✓(10)		-4_ _	
		FAULT					✓(10)		-4T_	
	LED type	RUN	✓	✓	✓(6), (10)	✓(7), (10)	✓(10)	✓(10)	-4L_	
		RUN-AT SPEED	✓				✓(10)	✓(10)	-4L_ _	
		FAULT			✓(6), (10)	✓(7), (10)	✓(10)	✓(10)	-4TL_	

Table is continued on the next page.

Table 236 - Bulletins 2162…2163 VFD Push Button, Control Station Housing, and Selector Switch Options

Option	Description		PowerFlex 40, 70, 520, 700, and 750 Series Drives						Option Number	Delivery Program
			2162Q 2162R 2163Q 2163R	2162T 2163T	2162W 2163W (8)	2162X 2163X (8)	2162U 2163U (8)	2162V 2163V (8) (11)		
Pilot Lights (Transformer Type for 800T, full voltage 800F) (1), (3)	Push-to-Test standard type	RUN	✓	✓			✓(10)		-5_	SC
		RUN–AT SPEED	✓				✓(10)		-5_ _	
		FAULT					✓(10)		-5T_	
	Push-to-Test LED type	RUN	✓	✓	✓(6), (10)	✓(7), (10)	✓(10)	✓(10)	-5L_	
		RUN-AT SPEED	✓				✓(10)	✓(10)	-5L_ _	
		FAULT			✓(6), (10)	✓(7), (10)	✓(10)	✓(10)	-5TL_	

(1) When three or less pilot devices are selected Bulletin 800T pilot devices are supplied except selector switches are Bulletin 800H devices. When more than three pilot lights are selected, 800F pilot devices are supplied. For 2162U, 2163U, 2162V, 2163V, 2162W, 2163W, 2162X, and 2163Xsee footnote 8.

(2) Options 1, 1E, and 3E are not available with communication module 14GC, 14GD, 14GE, 14GR.

(3) Extra space can be required for Bulletin 2162Q, 2163Q, 2162T, 2163T, 2162W, 2163W, 2162X, and 2163Xrefer to specific drive selection pages for specific space factor adders.

(4) Option -3F is mutually exclusive with option -1, -1E, -3, and -3E.

(5) For Bulletin 2162T and 2163T, option -1, -3, and -3F are mutually exclusive with each other.

(6) When -3F is selected only one Pilot Light is allowed.

(7) Only one Pilot Light is allowed.

(8) 800F pilot devices are supplied for all configurations.

(9) Option 3F is always wired to the built in 24VDC inputs.

(10) Pilot lights operate at 120V AC. When selecting RUN-AT SPEED and FAULT pilot lights, the pilot light style must be the same.
For 2162U and 2163U, when more than one pilot light is selected, a Digital & Analog optional I/O module -14DA2R1 or -14DA2R2 must be selected.
For 2162V and 2163V, when any pilot light is selected, a Digital & Analog optional I/O module -14DA2R_ must be selected.

(11) I/O Option Board -14DA2R1 or -14DA2R2 is required with any Push Button, Control Station Housing, or Selector Switch Options. When three pilot lights are selected, I/O Option Board needs to be -14DA2R3 or -14DA2R4 containing two I/O Boards.

(12) Option 3F is wired with 120V AC with option -14DA2R1 or -14DA2R3 and 24VDC with option -14DA2R2 or -14DA2R4.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 237 - Bulletins 2162…2163 VFD Communication Options

Option	Option Number	Description	PowerFlex 40, 70, 520, 700, and 750 Series Drives						Delivery Program
			2162Q 2163Q 2162R 2163R	2162T 2163T	2162W 2163W (7)	2162X 2163X	2162U 2163U	2162V 2163V (7)	
DeviceNet Communication Modules (mutually exclusive)	-11DSA2	For use with contactors and starters to provide DeviceNet inputs and outputs. Four 120V inputs and two 120V outputs. Not to be used with options 7FEC_ or 7FC_. Available for 110…120V control only.							SC
	-11DSA3	For use with contactors and starters to provide DeviceNet inputs and outputs. Four 24V DC inputs and two 240V AC (max), 30V DC (max) outputs. Not to be used with 7FEC_ or 7FC_. Available for 110…120V AC or 220…240V AC control voltage.							
Communication Module(1)	-14GC(2) (3)	ControlNet Communication Module, Mounted Internal to Drive. Includes one 1786-TPYS tap, supplied loose for customer mounting.	✓	✓(5) (6)			✓(6) (8)	✓(6) (9)	
	-14GD(3)	DeviceNet communication module, mounted internal to drive.	✓	✓(5) (6)	✓(5) (6)	✓(5) (6)	✓(6) (8)	✓(6) (9)	
	-14GE(2)	Ethernet communication module. Mounted internal to drive.	✓	✓(5) (6)					
	-14GEL(4)	Ethernet communication module. Mounted internal to drive.							
	-14GER	Dual port DLR Ethernet communication module. Mounted internal to drive.			✓(5) (6)	✓(5) (6)	✓	✓	
	-14GR(3)	Remote I/O communication module, mounted internal to drive	✓						

(1) Communication modules (options -14GC, 14GD, 14GE, and 14GR) are mutually exclusive on Bulletins 2162Q, 2162R, 2163Q, 2163R, 2162T, and 2163T.

(2) Not available on DeviceNet Orders. For PowerFlex 520 Series Drives, this option calls out the 25-COMM-E2P comm card.

(3) Not available on IntelliCENTER MCC with EtherNet/IP network orders.

(4) No longer available on new orders as of April 20, 2015.

(5) When 14GC, 14GD, 14GE, 14GEL, or 14GER is specified with Human Operator Interface Module (Option 14HBA3 or 14HC2S) speed control on the Human Interface Module is not functional.

(6) Communication module options are mutually exclusive with one another and will be installed in Port 6.

(7) Drive comes with an embedded Ethernet port.

(8) A maximum of three non-mutually exclusive options can be selected.

(9) A maximum of five non-mutually exclusive options can be selected.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 238 - Bulletins 2162…2163 VFD HIM Options

Option	Option Number	Description		PowerFlex 40, 70, 520, 700, and 750 Series Drives						Delivery Program
				2162Q 2163Q 2162R 2163R	2162T 2163T	2162W 2163W	2162X 2163X	2162U 2163U	2162V 2163V	
Human Interface Module (HIM)[1] (mutually exclusive)	-14HBA0	No HIM (blank plate)	Mounted in bezel on the door. HIM is removable. NEMA 1, 1G only. Cable to drive is included.	✓	✓	✓	✓	✓	✓	SC
	-14HBA3	LCD display, full numeric keypad		✓	✓	✓	✓			
	-14HBA5	LCD display, programmer only		✓						
	-14HBA6	LCD display, full numeric keypad						✓	✓	
	-14HBN1	LCD display, Wireless Interface Module								
	-14HA0	No HIM (blank plate)	Mounted inside unit on drive. Available on NEMA Type 1, 1 with gasket and 12. Includes viewing window on door.	✓[2]				✓	✓	
	-14HA3	LCD display, full numeric keypad		✓[2]						
	-14HA5	LCD display, programmer only		✓[2]						
	-14HA6	LCD display, full numeric keypad						✓	✓	
	-14HC2S	LCD display, digital keypad	Door mounted. HIM is not removable. Cable to drive is included. NEMA Type 12 Only.		✓	✓	✓			
	-14HC3S	LCD display, full numeric keypad		✓						
	-14HC5S	LCD display, programmer only		✓						
	-14HC6S	LCD display, full numeric keypad						✓	✓	
	-14HN4S	LCD display, Wireless Interface Module door mounted								

(1) A Human Interface Module (HIM) must be selected, except on Bulletin 2162T and 2163T. Optional door mounted HIMs are available for 2162T and 2163T units. Bulletin 2162T and 2163T drives include an integral HIM as standard. Bulletin 2162T and 2163T drives include a viewing window over the integral HIM module when optional HIM is not selected.

(2) Not available on Bulletin 2162R and 2163R with size code 300.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 239 - Bulletins 2162…2163 VFD Control Interface Options

Option	Option Number	Description	PowerFlex 40, 70, 525, 700, and 750 Series Drives							Delivery Program
			2162Q 2163Q	2162R 2163R	2162W 2163W	2162X 2163X	2162T 2163T	2162U 2163U	2162V 2163V	
Encoder Feedback	-14ENC1	Encoder Feedback Module, 12V		✓(8)	✓			✓(16) (17)	✓(17) (18)	SC
	-14DENC1(3)	Dual Encoder Feedback Module, 12V						✓(16) (17)	✓(17) (18)	
I/O Control Interface Type(1)	-14DA1C	24V DC Control Voltage Interface with Vector Control		✓(8)						
	-14DA1D	120V AC Control Voltage Interface with Vector Control		✓(8)						
	-14DA1E	24V DC Control Voltage with Sensorless Vector Control		✓(9)						
	-14DA1F	120V AC Control Voltage with Sensorless Vector Control		✓(9)						
	-14DA2R1(4)	Digital and Analog I/O Option Board, 120V AC control voltage inputs. Provides six Digital Inputs, two Digital (Form-C Relay Outputs), two Analog Inputs, two Analog Outputs.						✓(16)	✓(18) (19)	
	-14DA2R2(4)	Digital and Analog I/O Option Board, 24V DC control voltage inputs. Provides six Digital Inputs, two Digital (Form-C Relay Outputs), two Analog Inputs, two Analog Outputs.						✓(16)	✓(18) (19)	
	-14DA2R3(4)	Two Digital and Analog I/O Option Boards, 120V AC control voltage inputs. Provides six Digital Inputs, two Digital (Form-C Relay Outputs), two Analog Inputs, two Analog Outputs on each board.							✓(18) (19)	
	-14DA2R4(4)	Two Digital and Analog I/O Option Boards, 24V DC control voltage inputs. Provides six Digital Inputs, two Digital (Form-C Relay Outputs), two Analog Inputs, two Analog Outputs on each board.							✓(18) (19)	
Enhanced Control Platform Type(2)	-14C0	Enhanced control for PowerFlex 70 drive units	✓							
	-14G0	Enhanced control for PowerFlex 70 drive units with DriveGuard Safe-off Option	✓							
Analog Output Isolation	-14N2	Provides a DC signal that is proportional to the drive DC output signal. The signal is fully isolated from the drive output, line power and ground.	✓	✓			✓(15)			
Ungrounded Power System	-14PSUG	This option disconnects internal drive protective devices which are referenced to ground. This option is required if the drive is used on an ungrounded power system or a power system which is grounded through any impedance.	✓	✓(10)	✓(11)	✓(11)	✓	✓	✓	
Auxiliary Power Supply	-14APS	24V DC auxiliary power supply option module. Provides power to drive logic circuits when line power is removed from drive. Requires customer supplied source of 24V DC power. Option is installed in the location for Port 8.						✓	✓(18)	

Table is continued on the next page.

Table 239 - Bulletins 2162…2163 VFD Control Interface Options

Option	Option Number	Description		PowerFlex 40, 70, 525, 700, and 750 Series Drives							Delivery Program
				2162Q 2163Q	2162R 2163R	2162W 2163W	2162X 2163X	2162T 2163T	2162U 2163U	2162V 2163V	
Safety Systems	-14SFR1	Safe Torque-off Option, with Factory Installed MSR138DP safety relay. Relay uses a removable terminal block and accepts inputs for one N.C., two N.C., or Light Curtain, provides two N.O. safety outputs and three N.O. delayed safety outputs with 0.5…10 s delay. Relay control power is 115V AC.				✓			✓(16)	✓(18) (20)	SC
	-14SFR2	Safe Torque-off Option, with Factory Installed MSR138DP safety relay. Relay uses a removable terminal block and accepts inputs for one N.C., two N.C., or Light Curtain, provides two N.O. safety outputs and three N.O. delayed safety outputs with 0.5…10 s delay. Relay control power is 24V DC.				✓			✓(16)	✓(18) (20)	
	-14SRR	Safe Torque-off Option, requires customer supplied safety relay installed remotely from the MCC drive unit.							✓(16)	✓(18) (20)	
	-14S1(5)	Safe-speed Monitor Option (with integral safety relay)							✓(16)	✓(20) (21)	
EMC Filter	-14EMC(6)	Includes the EMC Filter (Cat. No. 25-RF___-___) and EMC Grounding Plate (Cat. No. 25-EMC1-F_)				✓	✓				
Drive Input Fusing	-14DFCC	Provides factory installed drive input fusing. Fuses supplied are UL Class CC Time Delay fuses.				✓(12)	✓(12)				
	-14DFAJT(7)	Provides factory installed drive input fusing. Fuses supplied are Gould, AJT UL Class J fuses.	30 A						✓	✓	
			60 A			✓(13)	✓(13)		✓	✓	
			100 A						✓	✓	
			200 A						✓	✓	
			400 A						✓	✓	
			600 A						✓	✓	
	-14DFLPJ(7)	Provides factory installed drive input fusing. Fuses supplied are Bussmann, LPJ UL Class J fuses.	30 A						✓	✓	
			60 A						✓	✓	
			100 A						✓	✓	
			200 A						✓	✓	
			400 A						✓	✓	
			600 A						✓	✓	
Thermostat	-14FCT	Provide thermostat for control of door mounted cooling fans. Factory set for 35 °C.				✓(14)	✓(14)		✓(14)	✓(14)	
Fuse	-21	Fuse (10 A) for customer supplied 120V AC separate control source. Fuse is used for factory wired connections to Digital Inputs only. Any factory wired pilot lights or cooling fans use the included control power transformer.				✓	✓		✓	✓	

(1) Control type MUST be selected for Bulletin 2162R and 2163R.

(2) Enhanced control option MUST be specified.

(3) When this option is selected with Option -14S1 (Safe-Speed Monitor), only one of the following options can be selected with in addition to this option: (1) Communication Module or (2) I/O Module(s). The Auxiliary Power Supply Option -14APS can also be selected.

(4) Digital/Analog I/O options are mutually exclusive with each other and is installed in Port 4. Options -14DA2R3 and -14DA2R4 consist of two cards and are installed in Port 4 and Port 7.

(5) This option must be selected with Option -14DENC1 (Dual Encoder Feedback). Only one of the following options can be selected with in addition to this option: (1) Communication Module or (2) I/O Module. The Auxiliary Power Supply Option -14APS can also be selected.

(6) Option can not be called out with the Ungrounded Power System option -14PSUG per product specifications.

(7) Optional UL Class J time delay fuses. These fuses provide both branch circuit protection and drive input protection. The drive input fuses are provided in series with the circuit breaker in Bulletin 2163U units.

(8) Available only for Bulletin 2162R and 2163R units, except units with size code 300.

(9) Available only for Bulletin 2162R and 2163R with size code 300.

(10) For size code 300, Bulletin 2162R and 2163R, option -14PSUG changes delivery program to Engineered. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative for availability.

(11) Option can not be called out with the EMC Filter option -14EMC per product specifications.

(12) Required on 2162W, 2163W, 2162X, and 2163X Drives with output ratings less than 19 A.

Footnotes continued on the next page.

(13) Required on 2162W, 2163W, 2162X, and 2163X Drives with output ratings greater than or equal to 19 A.
(14) Only available on units that have fans mounted on the door.
(15) Space factor adder can be required for Bulletin 2162T and 2163T. See pages 239…245.
(16) For Bulletin 2162U and 2163U, a maximum of three non-mutually exclusive options can be selected.
(17) Encoder options are mutually exclusive with each other. Encoder will be installed in the lowest port number available with the other options selected.
(18) For Bulletin 2162V and 2163V, a maximum of five non-mutually exclusive options can be selected. When -14DA2R3 or -14DA2R4 is selected, they are counted as two or of the five.
(19) Required with any Push Button, Control Station Housing, or Selector Switch Options.
(20) Option -14DA2R2 or -14DA2R4 is required with this option.
(21) When selected with Dual Encoder Feedback Option -14DENC1, only one of the following options can be selected: (1) Communication Module or (2) I/O Module(s)

Space Factor Adders for Line or Load Reactors

Consider a load reactor (connecting a reactor on the load side of the drive) to address one or more of the following issues:

- Multi-motor applications (one drive feeding more than one motor).
- A low voltage insulation class motor applied on a long cable length.
- 575V motor applications (other than short cable length applications).

A load reactor is NOT required for applications where:

- Line voltage is 230V or less.
- A Bulletin 1204 terminator unit is utilized.
- An Allen-Bradley controlled matched solution is being applied (for example, a 1850V CIV motor is used for a cable length of 600 ft. [185 m] or less in a 575V application).

A line reactor (connecting a reactor on the line side of the drive) is considered as a means to address one or more of the following issues:

- Applications with severe power line transient disturbances degrading the power quality of the incoming power line. For example, arcing during power line switching, arc welder applications, or switching of a system power factor correction capacitor bank at the main service, especially if the PFCC bank is switched by a vacuum contactor.
- Applications utilizing improvement of power line harmonic content.
  - However, due to the built-in DC link reactor internal to the Allen-Bradley IGBT-based PWM drives, a line reactor has little effect on the improvement of power line harmonic distortion.
- Applications exposed to excessive high voltage transients due to lightning.
  - However, a surge protective device unit for the total MCC is recommended for such applications (for example, catalog #2100-SPKB-1 or catalog #2100-SPKC-1).

Applications with both line and load reactors are not recommended without first contacting your local Allen-Bradley distributor or Rockwell Automation sales representative. While this application is not detrimental to the drive itself, it can produce erroneous drive operation caused by effects of common mode current. These effects can be influenced by drive HP, carrier frequency, motor load, and output cable length. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative when both line and load reactors are deemed necessary for the application.

Additional recommendations are available in the specific IGBT-based PWM inverter user manual. Consult these manuals for restrictions regarding drive carrier frequency, motor cable length and motor insulation class (inverter class motors). Information on the use of reactors and the use of Bulletin 1204 terminators can also be found in the user manuals.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 240 - Bulletins 2162…2163 VFD Line and Load Reactors

Option	Option Number	Description			PowerFlex 40, 70, 520, and 700 Series Drives		PowerFlex 753 and 755	Delivery Program
					2162Q 2162R 2162T 2162W 2162X	2163Q 2163R 2163T 2163W 2163X	2162U 2163U 2162V 2163V	
Line or Load Reactors(1)	-14R_(4) (See space factor adders on page 293)	3% impedance line or load reactor	480V	0.5…1 HP	✓	✓	✓	SC
				1.5…2 HP	✓	✓	✓	
				3…5 HP	✓	✓	✓	
				7.5 HP	✓	✓	✓	
				10 HP	✓	✓	✓	
				15 HP	✓	✓	✓	
				20…25 HP	✓	✓	✓	
				30 HP	✓	✓	✓	
				40 HP	✓	✓	✓	
				50…60 HP	✓	✓	✓	
				75 HP	✓	✓	✓	
				100 HP	✓	✓	✓	
				125 HP	✓	✓	✓	
				150 HP(5)	✓	✓	✓	
			600V	0.5 HP	✓	✓		PE in U.S.,SC in Canada
				1.5 HP	✓	✓		
				3…7.5 HP	✓	✓		
				10 HP	✓	✓		
				15 HP	✓	✓		
				20…25 HP	✓	✓		
				30 HP	✓	✓		
				40 HP	✓	✓		
				50…60 HP	✓	✓		
				75 HP	✓	✓		
				100 HP	✓	✓		
				125 HP	✓	✓		
				150 HP	✓	✓		
Load Reactor Only(2), (3)	-14RXL _ _ (4)	3% impedance load reactor for size code 300, Bulletin 2162R and 2163R drive units.	480V	150HP(5) 200 HP	✓	✓		PE-II

(1) Line and load reactors are mutually exclusive, as space factor adders can be required see page 293.

(2) Load reactors for Bulletin 2162R and 2163R, size code 300 drive units (150HP Heavy Duty at 480V and 200HP at 480V) are separate units from the drive units. The load reactors require an additional section mounted to the right of the section with the drive. The reactor is mounted in a supplementary drive unit in the bottom of the additional section. The two sections are one shipping split. Not available in back-to-back construction.

(3) Bulletin 2162R and 2163R, size code 300 rated units have approximately 3% of inherent line reactance.

(4) The option numbers listed are not complete:
- Select LX for line reactor or XL for load reactors (for example, 14RLX).
- For Bulletin 2162R and 2163R, size code 300 drive units (150HP Heavy Duty at 480V and 200HP at 480V), select the drive supplementary unit identification code (01…99) (for example, 14RLX01). The supplementary unit identification code must begin with '01' and increase sequentially with multiple drive units (02, 03, 04). Each drive unit is to have a unique supplementary unit identification code that correlates with the same identification code on the supplementary unit. See page 190 for catalog number.

(5) For 150 Hp, 480 V, Heavy Duty, Bulletin 2162R and 2163R units, refer to footnote (4), (2) and (3).

Space Factor Adders for Variable Frequency Drives

Table 241 - Space Factor Adders for Bulletins 2162Q and 2163Q 480V

NEMA Type	Rating Code	Space Factor Adder
1, 1G	1P1	0.5
	2P1	
	3P4	
	5P0	
	8P0	
	011	
	014	
	052	(1)
	065	
12	034	0.5
	065	(1)

(1) See unit pages for space factor adders.

Table 242 - Space Factor Adders for Bulletins 2162Q and 2163Q 600V

NEMA Type	Rating Code	Space Factor Adder
1, 1G	0P9	0.5
	1P7	
	2P7	
	3P9	
	6P1	
	9P0	
	011	
	041	(1)
	052	
12	027	0.5
	032	

Table 243 - Space Factor Adders for Bulletin 2162U and 2162V Normal Duty

Drive Rating Code, 480V	NEMA Type	Base Unit Space Factor	Space Factor Adder		
			14R_ _	112A	14R_ _ and 112A
2P1H, 3P4H, 5P0H,8P0H, 011H	1/1G	2.5	None	None	None
	12	2.5	None	None	None
014N	1/1G	2.5	None	None	0.5
	12	2.5	0.5	None	0.5
022N	1/1G	2.5	None	0.5	1.0
	12	3.0	0.5	None	0.5
027N, 034N	1/1G	2.5	0.5	0.5	0.5
	12	3.5	None	---	---
040N	1/1G	3.0	0.5	None	0.5
	12	3.5	0.5	---	---
052N	1/1G	3.0	0.5	0.5	0.5
	12	4.0	None	---	---
065N	1/1G	3.0	1.0	0.5	1.0
	12	4.0	(1)	---	---
077N	1/1G	6.0 S.F. x 20"W. x 15"D	None	None	None
	12	6.0 S.F. x 25"W. x 15"D	None	---	---
096N	1/1G	6.0 S.F. x 25"W. x 15"D	None	None	None
	12	6.0 S.F. x 25"W. x 15"D	None	---	---
125N	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None
	12	6.0 S.F. x 25"W. x 20"D	None	---	---
156N	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None
	12	6.0 S.F. x 30"W. x 20"D	None	---	---
186N	1/1G	6.0 S.F. x 25"W. x 20"D	None	5"W	5"W
	12	6.0 S.F. x 35"W. x 20"D	None	---	---
248N	1/1G	6.0 S.F. x 30"W. x 20"D	None	None	None
	12	---	---	---	---

(1) Type 12 w/ 14RLX or 14RXL becomes 6.0 S.F. 20"W x 15" D

Table 244 - Space Factor Adders for Bulletin 2162U and 2162V Normal Duty

Drive Rating Code, 600V	NEMA Type	Base Unit Space Factor	Space Factor Adder		
			14R_ _	112A	14R_ _ and 112A
1P7N, 2P7N, 3P9N	1/1G	2.5	None	None	None
	12	2.5	None	None	None
6P1N	1/1G	2.5	0.5	None	0.5
	12	2.5	0.5	None	0.5
9P0N, 011N	1/1G	2.5	0.5	0.5	0.5
	12	3	None	None	None
017N, 022N	1/1G	2.5	0.5	0.5	0.5
	12	3.5	None	---	---
027N	1/1G	3	0.5	None	0.5
	12	4	None	---	---
032N	1/1G	3	0.5	None	0.5
	12	4	None	---	---
041N	1/1G	6.0 S.F. x 20"W. x 15"D	None	None	None
	12	6.0 S.F. x 25"W. x 15"D	None	---	---
052N	1/1G	6.0 S.F. x 25"W. x 15"D	None	None	None
	12	6.0 S.F. x 25"W. x 15"D	None	---	---
063N, 077N	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None
	12	6.0 S.F. x 25"W. x 20"D	None	---	---
099N	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None
	12	6.0 S.F. x 30"W. x 20"D	None	---	---
125N	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None
	12	6.0 S.F. x 35"W. x 20"D	None	---	---
144N	1/1G	6.0 S.F. x 30"W. x 20"D	None	None	None
	12	---	---	---	---

Table 245 - Space Factor Adders for Bulletin 2162U and 2162V Heavy Duty

Drive Rating Code, 480V	NEMA Type	Base Unit Space Factor	Space Factor Adder		
			14R_ _	112A	14R_ _and 112A
2P1H, 3P4H, 5P0H,8P0H, 011H	1/1G	2.5	None	None	None
	12	2.5	None	None	None
022H	1/1G	2.5	None	0.5	1.0
	12	3.0	0.5	None	0.5
027H, 034H	1/1G	2.5	0.5	0.5	0.5
	12	3.5	None	- - -	- - -
040H	1/1G	3.0	0.5	None	0.5
	12	3.5	0.5	- - -	- - -
052H	1/1G	3.0	0.5	0.5	0.5
	12	4.0	None	- - -	- - -
065H	1/1G	3.0	1.0	0.5	1.0
	12	4.0	(1)	- - -	- - -
077H	1/1G	6.0 S.F. x 20"W. x 15"D	None	None	None
	12	6.0 S.F. x 25"W. x 15"D	None	- - -	- - -
096H	1/1G	6.0 S.F. x 25"W. x 15"D	None	None	None
	12	6.0 S.F. x 25"W. x 15"D	None	- - -	- - -
125H	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None
	12	6.0 S.F. x 25"W. x 20"D	None	- - -	- - -
156H	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None
	12	6.0 S.F. x 30"W. x 20"D	None	- - -	- - -
186H	1/1G	6.0 S.F. x 25"W. x 20"D	None	5" W	5" W
	12	6.0 S.F. x 35"W. x 20"D	None	- - -	- - -
248H	1/1G	6.0 S.F. x 30"W. x 20"D	None	None	None
	12	- - -	- - -	- - -	- - -

(1) Type 12 w/ 14RLX or 14RXL becomes 6.0 S.F. 20"W x 15" D

Table 246 - Space Factor Adders for Bulletin 2162U and 2162V Heavy Duty

Drive Rating Code, 600V	NEMA Type	Base Unit Space Factor	Space Factor Adder		
			14R_ _	112A	14R_ _ and 112A
1P7H, 2P7H, 3P9H, 6P1H	1/1G	2.5	None	None	None
	12	2.5	None	None	None
9P0H, 011H	1/1G	2.5	0.5	0.5	0.5
	12	3	None	None	None
017H, 022H	1/1G	2.5	0.5	0.5	0.5
	12	3.5	None	- - -	- - -
027H	1/1G	3	0.5	None	0.5
	12	4	None	- - -	- - -
032H	1/1G	3	0.5	None	0.5
	12	4	None	- - -	- - -
041H	1/1G	6.0 S.F. x 20"W. x 15"D	None	None	None
	12	6.0 S.F. x 25"W. x 15"D	None	- - -	- - -
052H	1/1G	6.0 S.F. x 25"W. x 15"D	None	None	None
	12	6.0 S.F. x 25"W. x 15"D	None	- - -	- - -
063H, 077H	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None
	12	6.0 S.F. x 25"W. x 20"D	None	- - -	- - -
099H	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None
	12	6.0 S.F. x 30"W. x 20"D	None	- - -	- - -
125H	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None
	12	6.0 S.F. x 35"W. x 20"D	None	- - -	- - -
144H	1/1G	6.0 S.F. x 30"W. x 20"D	None	None	None
	12	- - -	- - -	- - -	- - -

Table 247 - Space Factor Adders for Bulletin 2163U and 2163V Normal Duty

Drive Rating Code, 480V	NEMA Type	Base Unit Space Factor	Space Factor Adder						
			14DF_ _ _	14R_ _	14DF_ _ _ and 14R_ _	112A	14DF_ _ _ and 112A	14R_ _ and 112A	14DF_ _ _ and 14R_ _ and 112A
2P1H, 3P4H, 5P0H,8P0H, 011H	1/1G	2.5	None	None	None	None	None	None	None
	12	2.5	None	None	None	None	None	None	None
014N	1/1G	2.5	None	None	None	None	None	0.5	0.5
	12	2.5	None	0.5	0.5	None	None	0.5	0.5
022N	1/1G	2.5	None	None	None	0.5	0.5	1.0	1.0
	12	3.0	None	0.5	0.5	None	None	0.5	0.5
027N, 034N	1/1G	2.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	12	3.5	None	None	None	---	---	---	---
040N	1/1G	3.0	None	0.5	0.5	None	0.5	0.5	0.5
	12	3.5	None	0.5	0.5	---	---	---	---
052N	1/1G	3.0	None	0.5	0.5	0.5	0.5	0.5	0.5
	12	4.0	None	None	None	---	---	---	---
065N	1/1G	3.0	0.5	1.0	1.0	0.5	1.0	1.0	1.0
	12	4.0	None	(1)	(1)	---	---	---	---
077N	1/1G	6.0 S.F. x 20"W. x 15"D	5"W	None	5"W	None	5"W	None	5"W
	12	6.0 S.F. x 25"W. x 15"D	None	None	None	---	---	---	---
096N	1/1G	6.0 S.F. x 25"W. x 15"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 25"W. x 15"D	None	None	None	---	---	---	---
125N	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 25"W. x 20"D	None	None	None	---	---	---	---
156N	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 30"W. x 20"D	None	None	None	---	---	---	---
186N	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None	5"W	5"W	5"W	5"W
	12	6.0 S.F. x 35"W. x 20"D	None	None	None	---	---	---	---
248N	1/1G	6.0 S.F. x 30"W. x 20"D	None	None	None	None	None	None	None
	12	---	---	---	---	---	---	---	---

(1) Type 12 w/ 14RLX or 14RXL becomes 6.0 S.F. 20"W x 15" D

Table 248 - Space Factor Adders for Bulletin 2163U and 2163V Normal Duty

Drive Rating Code, 600V[1]	NEMA Type	Base Unit Space Factor	Space Factor Adder						
			14DF_ _ _	14R_ _	"14DF_ _ _ and 14R_ _	"112A	"14DF_ _ _ and 112A	"14R_ _ and 112A	14DF_ _ _ and 14R_ _ and 112A
1P7N, 2P7N, 3P9N	1/1G	2.5	None	None	None	None	None	None	None
	12	2.5	None	None	None	None	None	None	None
6P1N	1/1G	2.5	None	0.5	0.5	None	None	0.5	0.5
	12	2.5	None	0.5	0.5	None	None	0.5	0.5
9P0N, 011N	1/1G	2.5	None	0.5	0.5	0.5	0.5	0.5	0.5
	12	3	None	None	None	None	None	None	None
017N, 022N	1/1G	2.5	None	0.5	0.5	0.5	0.5	0.5	0.5
	12	3.5	None	None	None	---	---	---	---
027N	1/1G	3	None	0.5	0.5	None	None	0.5	0.5
	12	4	None	None	None	---	---	---	---
032N	1/1G	3	None	0.5	0.5	None	None	0.5	0.5
	12	4	None	None	None	---	---	---	---
041N	1/1G	6.0 S.F. x 20"W. x 15"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 25"W. x 15"D	None	None	None	---	---	---	---
052N	1/1G	6.0 S.F. x 25"W. x 15"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 25"W. x 15"D	None	None	None	---	---	---	---
063N, 077N	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 25"W. x 20"D	None	None	None	---	---	---	---
099N	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 30"W. x 20"D	None	None	None	---	---	---	---
125N	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 35"W. x 20"D	None	None	None	---	---	---	---
144N	1/1G	6.0 S.F. x 30"W. x 20"D	None	None	None	None	None	None	None
	12	---	---	---	---	---	---	---	---

(1) Fusing is not optional with 140G Breakers at 600V.

Table 249 - Space Factor Adders for Bulletin 2163U and 2163V Heavy Duty

Drive Rating Code, 480V	NEMA Type	Base Unit Space Factor	Space Factor Adder						
			14DF_ _ _	14R_ _	14DF_ _ _ and 14R_ _	112A	14DF_ _ _ and 112A	14R_ _ and 112A	14DF_ _ _ and 14R_ _ and 112A
2P1H, 3P4H, 5P0H,8P0H, 011H	1/1G	2.5	None	None	None	None	None	None	None
	12	2.5	None	None	None	None	None	None	None
022H	1/1G	2.5	None	None	None	0.5	0.5	1.0	1.0
	12	3.0	None	0.5	0.5	None	None	0.5	0.5
027H, 034H	1/1G	2.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	12	3.5	None	None	None	---	---	---	---
040H	1/1G	3.0	None	0.5	0.5	None	0.5	0.5	0.5
	12	3.5	None	0.5	0.5	---	---	---	---
052H	1/1G	3.0	None	0.5	0.5	0.5	0.5	0.5	0.5
	12	4.0	None	None	None	---	---	---	---
065H	1/1G	3.0	0.5	1.0	1.0	0.5	1.0	1.0	1.0
	12	4.0	None	(1)	(1)	---	---	---	---
077H	1/1G	6.0 S.F. x 20"W. x 15"D	5"W	None	5"W	None	5"W	None	5"W
	12	6.0 S.F. x 25"W. x 15"D	None	None	None	---	---	---	---
096H	1/1G	6.0 S.F. x 25"W. x 15"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 25"W. x 15"D	None	None	None	---	---	---	---
125H	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 25"W. x 20"D	None	None	None	---	---	---	---
156H	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 30"W. x 20"D	None	None	None	---	---	---	---
186H	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None	5"W	5"W	5"W	5"W
	12	6.0 S.F. x 35"W. x 20"D	None	None	None	---	---	---	---
248H	1/1G	6.0 S.F. x 30"W. x 20"D	None	None	None	None	None	None	None
	12	---	---	---	---	---	---	---	---

(1) Type 12 w/ 14RLX or 14RXL becomes 6.0 S.F. 20"W x 15" D

Table 250 - Space Factor Adders for Bulletin 2163U and 2163V Heavy Duty

Drive Rating Code, 600V[1]	NEMA Type	Base Unit Space Factor	Space Factor Adder						
			14DF_ _ _	14R_ _	"14DF_ _ _ and 14R_ _	"112A	"14DF_ _ _ and 112A	"14R_ _ and 112A	14DF_ _ _ and 14R_ _ and 112A
1P7H, 2P7H, 3P9H, 6P1H	1/1G	2.5	None	None	None	None	None	None	None
	12	2.5	None	None	None	None	None	None	None
9P0H, 011H	1/1G	2.5	None	0.5	0.5	0.5	0.5	0.5	0.5
	12	3	None	None	None	None	None	None	None
017H, 022H	1/1G	2.5	None	0.5	0.5	0.5	0.5	0.5	0.5
	12	3.5	None	None	None	---	---	---	---
027H	1/1G	3	None	0.5	0.5	None	None	0.5	0.5
	12	4	None	None	None	---	---	---	---
032H	1/1G	3	None	0.5	0.5	None	None	0.5	0.5
	12	4	None	None	None	---	---	---	---
041H	1/1G	6.0 S.F. x 20"W. x 15"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 25"W. x 15"D	None	None	None	---	---	---	---
052H	1/1G	6.0 S.F. x 25"W. x 15"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 25"W. x 15"D	None	None	None	---	---	---	---
063H, 077H	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 25"W. x 20"D	None	None	None	---	---	---	---
099H	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 30"W. x 20"D	None	None	None	---	---	---	---
125H	1/1G	6.0 S.F. x 25"W. x 20"D	None	None	None	None	None	None	None
	12	6.0 S.F. x 35"W. x 20"D	None	None	None	---	---	---	---
144H	1/1G	6.0 S.F. x 30"W. x 20"D	None	None	None	None	None	None	None
	12	---	---	---	---	---	---	---	---

(1) Fusing is not optional with 140G Breakers at 600V.

Table 251 - Space Factor Adders for Bulletin 2162W, 2163W, 2162X and 2163X

Drive Rating Code	NEMA Type	Base Unit Space Factor	Space Factor Adder											
			Control XFMR	14DF___ Drive Fuses	Control Station	14H___ Door Mounted HIM	EMC Filter Kit	14R___ Reactor	Fan Thermo	MSR Safety Relay	120V AC Separate Control	112A	112A w/ EMC or Reactor	112A w/ EMC and Reactor
0P9, 1P4, 1P7, 2P3	1/1G	1.0	None	None	0.5	None	0.5(1)	0.5(1)	None	0.5	None	0.5	0.5	1.0
3P0, 4P0, 4P2, 6P0	1/1G	1.0	None	None	0.5	None	0.5(1)	0.5(1)	None	0.5	None	1.0	1.0	1.0
6P6, 010	1/1G	1.0	None	None	0.5	None	0.5(1)	0.5(1)	None	0.5	None	1.0	1.0	1.5
0P9, 1P4, 1P7, 2P3	12	1.5	None	None	None	None	0.5	0.5	---	None	None	None	None	None
3P0, 4P0, 4P2, 6P0	12	2.0	None	None	None	None	None	None	---	None	None	None	None	None
6P6, 010	12	2.0	None	None	None	None	0.5	0.5	---	None	None	None	None	None
9P9, 012, 013, 017	1/1G	2.0	None	None	None	None	None	None	None	None	None	0.5	0.5	1.0
019, 024	1/1G	2.0	None	None	None	None	(1)	(1)	None	None	None	1.0	1.0	1.0
022	1/1G	2.0	None	None	None	None	(1)	(1)	None	None	None	1.5	1.5	2.0
030	1/1G	2.5	None	None	None	None	(1)	(1)	None	None	None	1.0	1.0	1.0
9P9, 012, 013	12	2.5	None	None	None	None	(1)	(1)	---	None	None	None	None	None
017	12	2.5	None	None	None	None	0.5	0.5	---	None	None	None	None	None
019, 024	12	3.0	None	None	None	None	(1)	(1)	None	None	None	---	---	---
022	12	3.5	None	None	None	None	None	None	None	None	None	---	---	---
030	12	3.5	None	None	None	None	None	None	None	None	None	---	---	---

(1) Combination of EMC Filter Kit and 14R___ Reactor requires an additional 0.5 SF.

Table 252 - Space Factor Adders for Bulletins 2162R and 2163R 480V

NEMA Type	Rating Code	Space Factor Adder
1, 1G	027 (1)	0.5
	034	
	040	
	052	
	065 (2)	0.5, 1.0
12	1P1 (1)	0.5
	2P1 (1)	
	3P4 (1)	
	5P0 (1)	
	034	
	040	

Table 253 - Space Factor Adders for Bulletins 2162R and 2163R 600V

NEMA Type	Rating Code	Space Factor Adder
1, 1G	022 (1)	0.5
	027	
	032	
	041	
	052 (3)	
12	1P7 - 3P9 (1)	
	027	
	032	

(1) Bulletin 2163R only.
(2) Bulletin 2162R requires 1.0 space factor adder and Bulletin 2163R requires 0.5 space factor adder.
(3) Bulletin 2162R only.

2162 and 2163 Variable Frequency Drive Options

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 254 - Bulletins 2162…2163 VFD Grounding, Control Wiring, and Miscellaneous Options

Option	Option Number	Description		PowerFlex 40, 70, 520, 700, and 750 Series Drives		Delivery Program
				2162Q 2162R 2162T 2162U 2162V 2162W 2162X	2163Q 2163R 2163T 2163U 2163V 2163W 2163X	
Grounded Unit Door[1]	-79GD	Hinge mounted ground strap mounted on hinge of unit door. Unit door grounding strap for IEC requirements.		✓	✓	SC
Unit Load Connector	-79L	Specify on plug-in units for sections with unplated vertical unit load ground bus.	Unplated copper	✓	✓	
	-79LT[2]	Specify on plug-in units for sections with tin plated vertical unit load ground bus.	Tin plated cooper	✓	✓	
Unit Ground Stab	—	Specify on plug-in units for sections with vertical plug-in ground bus. Unplated copper unit ground stab can also be used with steel vertical ground bus.	Copper alloy	✓	✓	
	-79U		Unplated copper	✓	✓	
	-79UT[2]		Tin plated cooper	✓	✓	
Auxiliary Contacts	-98[3]	Normally Open—One N.O. mounted on operating mechanism (operates with movement of external handle only)		✓	✓	
	-99[3]	Normally Closed—One N.C. mounted on operating mechanism (operates with movement of external handle only)		✓	✓	
	-790K[4]	One Form C Aux mounted internally in Circuit Breaker			✓	
	-790L[4]	Two Form C Aux mounted internally in Circuit Breaker			✓	
	-790A[4]	One Form C Aux, One Form C Alarm mounted internally in Circuit Breaker			✓	
	-790T[4]	One Form C Alarm mounted internally in Circuit Breaker			✓	
T-Handle	-111	T-Handle latch on unit door. Not available on 2160R units.		✓	✓	
Arc Resistant Latches	-112A	Make the unit ArcShield compatible.		✓	✓	

Table is continued on the next page.

Table 254 - Bulletins 2162…2163 VFD Grounding, Control Wiring, and Miscellaneous Options

Option	Option Number	Description		PowerFlex 40, 70, 520, 700, and 750 Series Drives		Delivery Program
				2162Q 2162R 2162T 2162U 2162V 2162W 2162X	2163Q 2163R 2163T 2163U 2163V 2163W 2163X	
Control Circuit Wiring	—	Type MTW (TEW) 90°C #16 AWG copper wire, VW1 rated		✓	✓	SC
Control Wire Markers	-751D	Brady Datab wire markers at each end of the control wires. Not available in Canada.		✓	✓	
	-751HS	Heat shrink type wire markers		✓	✓	SC (+2 days)
	-751S	Sleeve type wire marker		✓	✓	SC
Shunt Trip	-754	Shunt Trip Relay. Applying potential to the relay trips the breaker. (120V)			✓	
Undervoltage Release	-780	Undervoltage relay. Loss of potential to the relay trips the breaker. (120V)			✓	
French Legend Plates	-860F	Legend plates printed in French are available on all pilot devices. Specify 860F when pilot device options are selected.		✓	✓	
Spanish Legend Plates	-860S	Legend plates printed in Spanish are available on all pilot devices. Specify 860S when pilot device options are selected.		✓	✓	
Unit Door Nameplates[1]	—	Door Nameplate Screws	Plated steel nameplate screws. Provided when cardholder or nameplates are not selected.	✓	✓	
		Card Holder for Unit Doors	1.125'' x 3.625'' plastic card holders with blank cards	✓	✓	SC-II
		1.125" x 3.625" engraved 3-line nameplate or 4-line nameplate	Acrylic plate (available in U.S. only). Nameplate is white with black letters or black with white letters.	✓	✓	
			Phenolic plate. Nameplate is white with black letters or black with white letters.	✓	✓	
Stainless Steel Nameplate Screws[1]	—	Stainless steel nameplate screws for unit nameplates (2 per unit)		✓	✓	
Export Packing Below Deck	—	Container is skid mounted and packaged in clear plastic. Packing is not watertight or waterproof. Extended storage may require space heater and other considerations. For sections, see page 34.		✓	✓	SC (+2 days)

(1) Also available on Bulletin 2160R units.

(2) Unit Load Ground Connector and Unit Ground Stab plating must match, horizontal & vertical ground bus plating.

(3) The maximum number of auxiliary contacts that can be supplied internally is two, in any combination. Contacts actuate with movement of unit handle to ON or OFF position only. Contacts are not designed to actuate as a result of a circuit breaker trip. For such applications, auxiliary contacts -790K (G, H, and J) and -790A (all other frames) mounted internally must be selected. Auxiliary contacts are supplied unwired.

(4) These are form C contacts. Each form C contact includes one N.O. and one N.C. contact. Internal auxiliary contacts -790K (G, H, and J) and -790A (all other frames) are wired to a 3-point unmounted terminal block.

Chapter 17

Programmable Controller Units

Bulletin 2180L, 2182L, 2183L with Bulletin 1756 ControlLogix Chassis

The Bulletin 2180L, 2182L and 2183L units include a choice of one 4-slot or one 7-slot Bulletin 1756 ControlLogix chassis.

Unit Features

Without disconnecting means or plug-in stabs:

- 4-slot chassis, 1.0 space factor.
- 7-slot chassis, 2.0 space factor (frame mounted unit, section does not have vertical wireway next to this unit). Bottom mounted only.

With disconnecting means:

- Fusible disconnect (30 A switch), plug-in stabs, control circuit transformer, 4-slot chassis, 1.5 space factor.
- Fusible disconnect (30 A switch) without plug-in stabs, control circuit transformer, 7-slot chassis, 2.0 space factor (frame mounted unit, section does not have vertical wireway next to this unit).Bottom mounted only.
- Circuit breaker (15 A trip), plug-in stabs, control circuit transformer, 4-slot chassis, 1.5 space factor.
- Circuit breaker (15 A trip) without plug-in stabs, control circuit transformer, 7-slot chassis, 2.0 space factor (frame mounted unit, section does not have vertical wireway next to this unit). Bottom mounted only.

Unit Options

- Processor cards (all memory upgrade options).
- Communication cards (Ethernet, ControlNet, DeviceNet, Remote I/O DH+).
- Power supply (10.0 A)

Catalog Number Explanation - Bulletin 2180, 2182 and 2183 Programmable Control I/O Chassis Units

- NEMA Enclosure Type 1, Type 1 with gasket and Type 12
- Type A Wiring

Table 255 -

2180L	-	**A**	**K**	**XWD**	-		-	**
2182L	-	**A**	**K**	**B**	-		-	**
2183L	-	**A**	**K**	**B**	-	**30THM**	-	**
Bulletin Number		Number of I/O Chassis and Slots	NEMA Enclosure Type	Line Voltage		Trip Current and Circuit Breaker Type		Options

Code	Type
2180L	Bulletin 1756 ControlLogix Programmable Controller (PLC) I/O Chassis without Disconnecting Means(1)
2182L	Bulletin 1756 ControlLogix Programmable Controller (PLC) I/O Chassis with Fusible Disconnect(1)
2183L	Bulletin 1756 ControlLogix Programmable Controller (PLC) I/O Chassis with Circuit Breaker(1)

(1) 2180LB, 2182LB and 2183LB indicate bottom mounting on section.

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

Code	Line Voltage
P	220 - 230V
A	240V
N	380V
KN	400V
I	415V
B	480V
C	600V
XWD	120V

Does not include transformer or power bus stabs.

Code	Option
See Options section beginning on page 309.	

Code	Number of I/O Chassis and Slots
A	(1) 4-slot chassis
B	(1) 7-slot chassis (Bulletins 2180L, 2182L, and 2183L)

Code	Trip Current and Circuit Breaker Type
Bulletin 2183_ Only	See Table on page 307

Units—2180L, 2182L, 2183L Bulletin 1756 ControlLogix Programmable Controller (PLC)

- See page 305 for product description.
- Basic configuration does not include processor, input, output, adapter modules, or power supply.

Table 256 - Bulletin 1756 I/O Chassis Units

Bulletin	I/O Chassis		Space Factor	Catalog Number (3) Wiring Type A Only - Class I		Delivery Program
	Chassis Quantity	Chassis Size		NEMA Type 1 and Type 1 w/gasket	NEMA Type 12	
2180L (1) Basic I/O chassis without disconnecting means or plug-in stabs. Includes viewing window.	1	4 slot	1.0	2180L-AKXWD	2180L-AJXWD	SC
	1	7 slot	2.0 (2)	2180LB-BKXWD	2180LB-BJXWD	SC-II
2182L (1) Basic I/O chassis with disconnect and transformer. Includes viewing window.	1	4 slot	1.5	2182L-AK___	2182L-AJ___	SC
	1	7 slot	2.0 (2)	2182LB-BK___	2182LB-BJ___	SC-II
2183L (1) Basic I/O chassis with circuit breaker and transformer. Includes viewing window.	1	4 slot	1.5	2183L-AK_-30___	2182L-AJ_-30___	SC
	1	7 slot	2.0(2)	2183LB-BK_-30___	2183LB-BJ_-30___	SC-II

(1) A power supply must be selected for all 2180L, 2182L and 2183L units. Refer to the Options table on page 309.

(2) Frame mounted unit, section does not have vertical wireway next to this unit. Must be mounted at bottom of section. Cannot be used in section with 9″ vertical wireway. May not be mounted in a section containing other frame mounted units.

(3) Catalog numbers listed are not complete:
- Select appropriate voltage code from Table 257 to identify the control transformer primary voltage (for example, 2182L-BK**B**).
- For Bulletin 2183L, also select the suffix letter from Table 258 to identify the circuit breaker type (for example, 2183L-BKB-30**TGM**).

Table 257 - Primary Voltage for Transformer

Primary Voltage	Voltage Code
220/230	P
240	A
380	N
400	KN
415	I
480	B
600	C

Table 258 - Circuit Breaker Options and Adders (for combination short circuit ratings, see page 358) (1)

Circuit Breaker Frame Type	Suffix
G6C3	TGM
H6C3	THM
J15C3	TJU

(1) Refer to the CENTERLINE Motor Control Centers Thermal Magnetic Circuit Breakers, publication 2100-TD032 , for more information.

Notes:

Factory-Installed Options, Modifications, Accessories for Programmable Controllers

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 259 - Communication, Door, Ground Stab, and Contact Options

Option	Option Number	Description		Bulletin 1756 ControlLogix Chassis			Delivery Program
				2180L	2182L	2183L	
Power Supply [1]	-12PA72	Bulletin 1756-PA72, 10.0A power supply for 4- and 7-slot ControlLogix chassis		✓	✓	✓	SC
ControlLogix Processor [2]	-12LPA_	Logix5561 Processor With 2Mbyte Memory, includes 1784-CF64 64Mbyte CompactFlash memory module		✓	✓	✓	PE
	-12LPB_	Logix5562 Processor With 4Mbyte Memory, includes 1784-CF64 64Mbyte CompactFlash memory module		✓	✓	✓	
	-12LPC_	Logix5563 Processor With 8Mbyte Memory, includes 1784-CF64 64Mbyte CompactFlash memory module		✓	✓	✓	
	-12LPD_	Logix5564 Processor With 16Mbyte Memory, includes 1784-CF64 64Mbyte CompactFlash memory module		✓	✓	✓	
ControlLogix Communication Modules [2]	-12CN___ [3]	Bulletin 1756-CNBR ControlNet communication module with redundant ControlNet port		✓	✓	✓	SC
	-12ENB___	Bulletin 1756-ENBT Ethernet communication module		✓	✓	✓	
	-12DN___	Bulletin 1756-DNB DeviceNet communication module		✓	✓	✓	
	-12DH___	Bulletin 1756-DHRIO Data Highway Plus and Remote I/O communication module		✓	✓	✓	
ControlLogix Programming Cable	-12CP	Bulletin 1756-CP3 cable for programming ControlLogix processors		✓	✓	✓	
ControlNet T-Tap	-12CNT_ [3]	Bulletin 1786 ControlNet T-Tap for use with ControlNet Communication Modules		✓	✓	✓	
Grounded Unit Door	-79GD	Hinge mounted ground strap mounted on hinge of unit door. (Unit door grounding strap for IEC requirements.)		✓	✓	✓	
Unit Ground Stab	—	Select on plug-in units for sections with vertical plug-in ground bus. Unplated copper unit ground stab can also be used with steel vertical ground bus.	Copper alloy	✓	✓	✓	
	-79U		Unplated copper	✓	✓	✓	
	-79UT [4]		Tin plate copper	✓	✓	✓	

Table is continued on the next page.

Table 259 - Communication, Door, Ground Stab, and Contact Options

Option	Option Number	Description		Bulletin 1756 ControlLogix Chassis			Delivery Program
				2180L	2182L	2183L	
Auxiliary Contacts	-98 (5)	**Normally Open**—One N.O. mounted on operating mechanism (operates with movement of external handle only)	Disconnects		✓		SC
			Circuit Breakers			✓	
	-99 (5)	**Normally Closed**—One N.C. mounted on operating mechanism (operates with movement of external handle only)	Disconnects		✓		
			Circuit Breakers			✓	
	-790K(6)	One Form C Aux mounted internally in Circuit Breaker				✓	
	-790L(6)	Two Form C Aux mounted internally in Circuit Breaker				✓	
	-790A(6)	One Form C Aux, One Form C Alarm mounted internally in Circuit Breaker				✓	
	-790T(6)	One Form C Alarm mounted internally in Circuit Breaker				✓	
	-790B(6)	Two Form C Aux, One Form C Alarm mounted internally in Circuit Breaker				✓	

(1) Power supply options are mutually exclusive. Refer to table on page 366 for supplied control circuit transformer.

(2) Option numbers are not complete. Add the number of chassis slot the option is to be mounted in (for example, a 12LPA_ located in slot 0 is 12LPA0 and a 12ENB_ located in slot 3 is 12ENB3). Multiple quantities of the same option can be mounted in the same chassis (for example, a 7-slot chassis can contain two processor cards, two ethernet cards, one ControlNet card, and two DeviceNet cards).

(3) Option 12CNT_, Bulletin 1786 ControlNet T-Tap, is available for use with option 12CN_ for connection to ControlNet scheme. See the ControlNet Coax Media Planning and Installation Guide, publication CNET-IN002, for cabling configuration. Option number not complete. Add the corresponding slot number for the associated 12CN_. Option -12CNT_ is not available alone.

(4) Unit Load Ground Connector and Unit Ground Stab plating must match, horizontal and vertical ground bus plating

(5) The maximum number of auxiliary contacts that can be supplied is two in any combination. Contacts actuate with movement of unit handle to ON or OFF position only. Contacts are not designed to actuate as a result of a circuit breaker trip. For such applications, auxiliary contacts -790K (G, H, and J) and -790A (all other frames) mounted internally must be selected. Auxiliary contacts are supplied unwired.

(6) These are form C contacts. Each form C contact includes one N.O. and one N.C. contact. Internal auxiliary contacts -790K (G, H, and J) and -790A (all other frames) are wired to a 3-point unmounted terminal block.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

Table 260 - T-Handle, Wire Marker, and Nameplate Options

Option	Option Number	Description		Bulletin 1756 ControlLogix Chassis			Delivery Program
				2180L	2182L	2183L	
T-Handle	-111	T-Handle latches on unit door		✓	✓	✓	SC
Control Wire Markers	-751D	Adhesive Brady Datab type markers at each end of control wire. Not available in Canada.			✓	✓	SC
	-751HS	Heat shrink type wire marker			✓	✓	SC (+2 days)
	-751S	Sleeve type wire marker			✓	✓	SC
Unit Door Nameplates	—	Door Nameplate Screws	Plated steel nameplate screws. Provided when cardholder or nameplates are not selected.	✓	✓	✓	SC
		Card Holder for Unit Doors	1.125'' x 3.625'' plastic card holders with blank cards	✓	✓	✓	SC-II
		1.125″ x 3.625″ engraved 3-line nameplate or 4-line nameplate	Acrylic plate (available in U.S. only). Lettering is white with black letters or black with white letters.	✓	✓	✓	
			Phenolic plate. Lettering is white with black letters or black with white letters.	✓	✓	✓	
Stainless Steel Nameplate Screws	—	Stainless steel nameplate screws for unit nameplate (2 per unit)		✓	✓	✓	
Export Packing Below Deck	—	Container is skid mounted and packaged in clear plastic. Packing is not watertight or waterproof. Take considerations if extended storage is expected.		✓	✓	✓	SC (+2 days)

Notes:

Configuration Tables

IMPORTANT For Space Saving Units, please use Table 262.

Table 261 - Control Voltage Type for Bulletins 2102L, 2103L, 2106, 2107, 2112, 2113, 2122, and 2123

Control Voltage Code							Control Type
208V	240V	380V	400V	415V	480V	600V	
H	A	—	—	—	B	C	120V, 60 Hz, Transformer Control (1)
HD	AD	—	—	—	BD	CD	120V, 60 Hz, Separate Control (2)
—	—	N	—	I	—	—	110V, 50 Hz, Transformer Control (1),(3)
—	—	NS	—	IS	—	—	110V, 50 Hz, Separate Control (2)
—	—	—	KN	—	—	—	115V, 50 Hz, Transformer Control (1),(3)
—	—	—	KNS	—	—	—	115V, 50 Hz, Separate Control (2)
—	—	NP	—	—	—	—	220V, 50 Hz, Transformer Control (1),(3)
—	—	NP	—	—	—	—	220V, 50 Hz, Separate Control (2)
—	—	—	KNP	—	—	—	230V, 50 Hz, Transformer Control (1),(3)
—	—	—	KNP	—	—	—	230V, 50 Hz, Separate Control (2)
—	—	—	—	IT	—	—	240V, 50 Hz, Transformer Control (1),(3)
—	—	—	—	IT	—	—	240V, 50 Hz, Separate Control (2)
—	—	NLP	—	—	—	—	220V, 50 Hz, Line to Neutral Control, (Separate Control) (4),(5)
—	—	—	KNLP	—	—	—	230V, 50 Hz, Line to Neutral Control, (Separate Control) (4),(5)
—	—	—	—	ILT	—	—	240V, 50 Hz, Line to Neutral Control, (Separate Control) (4),(5)
H	A	—	—	—	B	C	Common Control (6),(7)

(1) Select a control circuit transformer. See Options section.
(2) Control circuit fusing (option 21) and/or disconnect interlock (option 98) can be required to comply with NEC. See Options section.
(3) Incorporates primary taps for future conversion to new global IEC voltage standards (for example, 400V/115V/230V). Allows conversion without the need to replace transformers or coils.
(4) Requires horizontal neutral bus and vertical neutral bus in 9″ vertical wireway. Refer to Section Modifications to select.
(5) Select control circuit fusing (see option 21 in Options section).
(6) Select control circuit fusing (see option 22 in Options section). Required to comply with NEC.
(7) Common control not available for Bulletins 2112 and 2113 vacuum contactor starter units.

Table 262 - Control Voltage Type for Space Saving NEMA Bulletins 2106, 2107, 2112, and 2113

Control Voltage Code		Control Type
480V	600V	
B	C	120V, 60 Hz, Transformer Control (1)
BD	CD	120V, 60 Hz, Separate Control (2)

(1) Select a control circuit transformer. See Options section.
(2) Control circuit fusing (option 21) and/or disconnect interlock (option 98) may be required to comply with NEC. See Options section.

Table 263 - Primary Voltage Code for Bulletins 2195, 2196, 2196Z, 2197, and 2197Z

240V	380V	400V	415V	480V	600V
A	N	KN	I	B	C

Table 264 - Control Voltage Type for Bulletins 2154 and 2155

Control Voltage Code								Control Type
220V (1)	230V (1)	240V	380V (1)	400V (1)	415V (1)	480V	600V	
P	—	—	N	—	I	—	—	110V, 50 Hz Transformer Control
—	P	—	—	KN	—	—	—	115V, 50 Hz Transformer Control
—	—	A	—	—	—	B	C	120V, 60 Hz Transformer Control

(1) Units at these voltages are not UL listed, C-UL listed, or CSA certified.

Table 265 - Control Voltage Type for Bulletins 2162 and 2163, 2164, and 2165

Line Voltage	Voltage Code
220/230	P (1),(2)
240	A (2)
380	N (1),(2)
400	KN (1),(2)
415	I (1),(2)
480	B
600	C

(1) Units at these voltages are not UL listed or CSA certified.
(2) Not applicable to 2164 or 2165.

Table 266 - Horsepower Ratings for All Bulletins(1)

Motor Hp	Number	Motor Hp	Number	Motor Hp	Number	Motor Hp	Number
0.125	30	3	38	40	46	250	56
0.25	31	5	39	50	47	300	57
0.33	32	7.5	40	60	48	350	58
0.50	33	10	41	75	49	400	59
0.75	34	15	42	100	50	450	60
1	35	20	43	125	51	500	61
1.5	36	25	44	150	52		
2	37	30	45	200	54		

(1) Not all HP ratings are available for all configurations. See PowerControl Builder for valid configuration options.

Table 267 - kW Ratings for Bulletins 2154, 2155, 2162, and 2163 (1)

kW	Number	kW	Number
0.25	32K	37	47K
0.37	33K	45	48K
0.55	34K	55	49K
0.75	35K	75	50K
1.1	36K	90	51K
1.5	37K	110	52K
2.2	38K	132	53K
3.7	39K	150	54K
5.5	40K	160	55K
7.5	41K	185	56K
11	42K	200	57K
15	43K	220	58K
18.5	44K	250	59K
22	45K		
30	46K		

(1) kW rated units are not UL listed, C-UL listed, or CSA certified.

Table 268 - Fuse Clip Designator Selection and Power Fuse Selection for Bulletins 2106, 2112, 2122, and 2126

Fuse Clip Rating (Amperes)	Fuse Clip Type	To select Fuse Clip Designator, select code from one of these two columns.		To select Power Fuses, select power fuse manufacturer code from these columns [2],[3].		
		When NO power fuses are selected, select fuse clip designator from this column.	When power fuses are selected, select fuse clip designator from this column [2],[3]. The '20' portion of your Fuse Clip Designator (for example, 20J) means that the fuse clip size and power fuse is selected automatically based on load horsepower. [4],[5]	Power Fuse Manufacturer Code [6]		Fuse Class (per set) [3]
				Typical (T) Accel. Time ≤ 5 s	Long (L) Accel. Time > 5 s	
30	CC	24C	20C	LT	LL	CC
30	J	24J	20J	GT or BT	GL or BL	J
	R	24R	20R			R
	H [2]	24	—			—
	HRCII-C [1]	24E	20E			HRCII-C
60	J	25J	20J	GT or BT	GL or BL	J
	R	25R	20R			R
	H [2]	25	—			—
	HRCII-C [1]	25E	20E			HRCII-C
100	J	26J	20J	GT or BT	GL or BL	J
	R	26R	20R			R
	H [2]	26	—			—
	HRCII-C [1]	26E	20E			HRCII-C
200	J	27J	20J	GT or BT	GL or BL	J
	R	27R	20R			R
	H [2]	27	—			—
	HRCII-C [1]	27E	20E			HRCII-C
400	J	28J	20J	GT or BT	GL or BL	J
	R	28R	20R			R
	H [2]	28	—			—
	HRCII-C [1]	28E	20E			HRCII-C
600	J	29J	20J	GT or BT	GL or BL	J
	R	29R	20R			R
	HRCII-C [1]	29E	20E			HRCII-C
800	L	24L	20L	GT or BT	GL or BL	L

(1) HRCII-C fuses are available in Canada only. HRCII-C Bussmann (BT or BL) fuses are not available; use HRCII-C Mersen (formerly Ferraz Shawmut) (option code GT or GL). They are CSA certified but are NOT UL listed.

(2) Power fuse option not available for Class H fuse clips or Space Saving NEMA starter units.

(3) Available on 480V and 600V applications only.
- To select power fuses for Bulletins 2106, 2112, 2122, and 2126:
- Then select power fuse manufacturer code and add to catalog string number (for example, 2106B-BABD-31**GT**-20J). Only use power fuse code when selecting power fuses.

(4) For Bulletins 2100D, 2102L, 2192F, and 2192M, see table on page 317. For Bulletin 2196, see page 319.

(5) Refer to the CENTERLINE Motor Control Centers Power Fuses, publication 2100-TD003, for more information.

(6) Select power fuse manufacturer code by indicating choice of power fuse manufacturer—LT or LL = LittelFuse, GT or GL = Mersen (formerly Ferraz Shawmut), and BT or BL = Bussmann. When selecting Bussmann or LittelFuse, delivery program changes to PE. The Mersen (formerly Ferraz Shawmut) Class J fuse incorporates blown fuse indication for fuses above 8 A.

Table 269 - Fuse Clip Designator Selection and Power Fuse Selection for Bulletins 2100D, 2102L, 2192F and 2192M [1],[2]

Use this information to select a fuse clip designator.			Use this information to select power fuses. [4],[5]			
Fuse Clip Rating (Amperes)	**Fuse Clip Class**	**Fuse Clip Designator**	**Power Fuse Rating (Amperes)**	**Power Fuse Rating Code**	**Power Fuse Manufacturer [6]**	**Fuse Class**
30	CC	24C	1	600	L [7]	CC
			3	601		
			6	602		
			10	603		
			15	604		
			20	605		
			25	606		
			30	607		
	J R H [4]	24J 24R 24	1	600	G or B [7]	J R —
			3	601		
			6	602		
			10	603		
			15	604		
			20	605		
			25	606		
			30	607		
60	J R H [4]	25J 25R 25	35	608		J R —
			40	609		
			45	610		
			50	611		
			60	612		
100	J R H [4]	26J 26R 26	70	613		J R —
			80	614		
			90	615		
			100	616		
200	J R H [4]	27J 27R 27	110	617		J R —
			125	618		
			150	619		
			175	620		
			200	621		
400	J R H [4]	28J 28R 28	225	622		J R —
			250	623		
			300	624		
			350	625		
			400	626		

Table is continued on the next page.

Table 269 - Fuse Clip Designator Selection and Power Fuse Selection for Bulletins 2100D, 2102L, 2192F and 2192M (1),(2)

Use this information to select a fuse clip designator.			Use this information to select power fuses. (4),(5)			
Fuse Clip Rating (Amperes)	**Fuse Clip Class**	**Fuse Clip Designator**	**Power Fuse Rating (Amperes)**	**Power Fuse Rating Code**	**Power Fuse Manufacturer (6)**	**Fuse Class**
600	J	29J	450	627	G or B (7)	J
	R	29R	500	628		R
	H (4)	29	600	629		—
	L	23L (3)	601	630		L
800	L	24L	601	630		L
			700	631		
			800	632		
1200	L	25L	1000	633		L
			1200	634		
1600	L	26L	1600	637		L
2000	L	27L	2000	639		L

(1) For Bulletins 2106, 2112, 2122, 2126, and 2154, see table on page 316. For Bulletin 2196, see page 319.
(2) Refer to the CENTERLINE Motor Control Centers Power Fuses, publication 2100-TD003, for more information.
(3) Available: G = Mersen (formerly Ferraz Shawmut), 601A only.
(4) Power fuse option is not available for Class H fuse clips.
(5) Available on 480V and 600V applications only. To select power fuses for Bulletins 2100D, 2102L, 2192F, and 2192M, combine power fuse rating code and power fuse manufacturer code and add to catalog string number (for example, 2102LB-BKBD-24J-**607G**). Only use power fuse code when selecting power fuses. Dual 2192F units require two sets of fuses. The fuse size code must correspond to the respective fuse clip designator code; the first fuse size code designates the fuse for the left side of the dual unit, the second code is for the right side of the dual unit. The fuse manufacturer for both fuses must be the same (for example, 2192F-CAC-2524J-609602G).
(6) L = Littelfuse, G = Mersen (formerly Ferraz Shawmut), B = Bussmann. The Mersen (formerly Ferraz Shawmut) Class J fuse incorporates blown fuse indication for fuses above 8 A.
(7) When selecting Bussmann or Littelfuse power fuses, delivery program changes to PE. Littelfuse power fuses are available only in Class CC fuses with blown fuse indicators.

Table 270 - Fuse Clip Designator for Bulletin 2196 and 2196Z (1),(2)

Fuse Clip Size	Fuse Clip Class	Fuse Clip Designator	Fuse Manufacturer Code (4) (Select G or B)
30	J	24J	G=Mersen (formerly Ferraz Shawmut) B=Bussmann
	R	24R	
	H (3)	24	
60	J	25J	G=Mersen (formerly Ferraz Shawmut) B=Bussmann
	R	25R	
	H (3)	25	
100	J	26J	G=Mersen (formerly Ferraz Shawmut) B=Bussmann
	R	26R	
	H (3)	26	
200	J	27J	G=Mersen (formerly Ferraz Shawmut) B=Bussmann
	R	27R	
	H (3)	27	

(1) Only 24J option available for 2196Z units.
(2) See Appendix for short circuit withstand ratings. For fuse rating based upon kVA of transformer, see publication 2100-TD003. Selecting Bussmann or Littelfuse power fuse changes delivery program to PE. Power fuses are not available for Class H fuse clip. Power fuses are available on 480V and 600V only.
(3) Power fuse option not available for Class H fuse clip.
(4) The Mersen (formerly Ferraz Shawmut) Class J fuse incorporates blown fuse indication for fuses above 8 A.

Table 271 - Trip Current for Bulletin 2103L

Contactor Rating (Amps)	Trip Current (Amps)	Number
30 or 60	15	30
	20	31
30, 60, or 100	30	32
60 or 100	40	34
	50	35
	60	36
100, 200, or 300	70	37 (2)
	80	38 (1)
	90	39 (2)
	100	40
200 or 300	125	41
	150	42
	175	43
	200	44
300	225	45
	250	46
	300	48

(1) Available only on 100 A contactors.

(2) Available only on 100 A and 200 A contactors.

Table 272 - Trip Current for Bulletin 2197 and 2197Z

Trip Current (Amperes)	Number
15	30
20	31
30	32
40	34
50	35
60	36
70	37
100	40
125	41
150	42
200	44

Table 273 - Circuit Breaker Type—Inverse Time (Thermal Magnetic) Circuit Breaker Options for Bulletin 2103L[1],[2]

Rating (Amperes)	High Interrupting Capacity 100 kA at 240V 65 kA at 480V				Extra High Interrupting Capacity 100 kA at 480V 35 kA at 600V (H…J Frame) 65 kA at 600V (K Frame)		Ultra High Interrupting Capacity 100 kA at 600V	
	Suffix Default	Frame	Suffix Optional	Frame	Suffix Default	Frame	Suffix	Frame
30 (0.5 SF)	TGM	G6C3	THM	H6C3	THX	H0C3		
30…70	TGM	G6C3	THM	H6C3	THX	H0C3		
100	TGM	G6C3	THM	H6F3	THX	H0C3		
200	TJM	J6F3	--------		TJX	J0F3		
300	TKM	K6F3	--------		TKX	K0F3	TKU	K15F3

(1) Refer to Appendix for interrupting capacity and short circuit withstand rating.
(2) Refer to the CENTERLINE Motor Control Centers Thermal Magnetic Circuit Breakers, publication 2100-TD032, for more information.

Table 274 - Inverse Time (Thermal Mag or Solid State) Circuit Breakers

Rating (Amperes)	High Interrupting Capacity 100 kA at 240V 100 kA at 480V		Extra High Interrupting Capacity 100 kA at 480V 35 kA at 600V		Ultra High Interrupting Capacity 100 kA at 600V	
	Suffix Default	Frame	Suffix Default	Frame	Suffix Default	Frame
200 VB	TJM	J6F3	TJX	J0F3		
400 VC	TKM	K6H3	TKX	K0H3	TKU	K15H3
600 VD	TMM	M6H3	TMX	M0H3	-----	------

Table 275 - Circuit Breaker Type for Bulletins 2107, 2113, and 2123[1]

MCP (Instantaneous)					Inverse Time (Thermal Mag or Solid State) Circuit Breakers									
NEMA Size	High Interrupting Capacity 100 kA at 240V 100 kA at 480V				High Interrupting Capacity 100 kA at 240V 65 kA at 480V				Extra High Interrupting Capacity 100 kA at 480V 35 kA at 600V		Ultra High Interrupting Capacity 100 kA at 600V			
	Suffix Default	Frame	Suffix Optional	Frame	Suffix Default	Frame	Suffix Optional	Frame	Suffix Default	Frame	Suffix Default	Frame	Suffix Optional	Frame
1	TGA[2]	MCP	THA[3]	MCP	TGM	G6C3	THM	H6C3	THX	H0C3	THUL[5]	H15H3	TJUL	J15H3
2	TGA	MCP	THA	MCP	TGM	G6C3	THM	H6C3	THX	H0C3	THUL[5]	H15H3	TJUL	J15H3
3	TGA	MCP	THA	MCP	TGM	G6C3	THM	H6C3	THX	H0C3	THUL[5]	H15H3	TJUL	J15H3
4	TJA	MCP	-----	------	TJM	J6F3	-----	------	TJX	J0F3	TJU	J15H3	------	------
5	TKA	MCP	-----	------	TKM	K6H3	-----	------	TKX[4]	K0H3	TKU	K15H3	------	------
6	TMA	MCP	-----	------	TMM	M6H3	-----	------	TMX	M0H3	-----	------	------	------

(1) Refer to CENTERLINE 2100 Motor Circuit Protection, publication 2100-TD032, for more information.
(2) 65 kA for 0…2 HP at 480V or less
(3) 42 kA for 0…3 HP at 600V
(4) 100 kA at 600V.
(5) 65 kA at 600V.

Table 276 - Circuit Breaker Type for Space Saving NEMA Bulletins 2107 and 2113

	MCP (Instantaneous)				Inverse Time (Thermal Mag or Solid State) Circuit Breakers					
NEMA Size	High Interrupting Capacity 100 kA at 240V 65 kA at 480V 35 kA at 600V				High Interrupting Capacity 100 kA at 240V 65 kA at 480V				Extra High Interrupting Capacity 100 kA at 480V 35 kA at 600V	
	Suffix Default	Frame	Suffix Optional	Frame	Suffix Default	Frame	Suffix Optional	Frame	Suffix Default	Frame
1	TGA	MCP	THA	MCP	TGM	G6C3	THM	H6C3	THX	H0C3
2	TGA	MCP	THA	MCP	TGM	G6C3	THM	H6C3	THX	H0C3
3	THA	MCP	-----	------	THM	H6F3	-----	------	THX	H0F3
4	TJA	MCP	-----	------	TJM	J6F3	-----	------	TJX	J0F3

Table 277 - Inverse Time (Thermal Magnetic) Circuit Breaker Options for Bulletin 2197

Rating (Amperes)	High Interrupting Capacity 100 kA at 240V 65 kA at 480V				Extra High Interrupting Capacity 100 kA at 480V 35 kA at 600V		Ultra High Interrupting Capacity 100 kA at 600V	
	Suffix Default	Frame	Suffix Optional	Frame	Suffix Default	Frame	Suffix Default	Frame
15…70	TGM	G6C	THM	H6C	THX	H0C	TJU	J15C
80…125	TGM	G6C	THM	H6F	THX	H0F	TJU	J15F
150	TJM	J6F	----------	----------	TJX	J0F	TJU	J15F
200	TJM	J6F	----------	----------	TJX	J0F	TJU	J15F

Table 278 - Circuit Breaker Type for Horsepower and kW Rated Units for Bulletins 2155H and 2155J

Rating	High Interrupting Capacity 100 kA at 240V 65 kA at 480V				Extra High Interrupting Capacity 100 kA at 480V 35 kA at 600V		Ultra High Interrupting Capacity 100 kA at 600V	
	Suffix Default	Frame	Suffix Optional	Frame	Suffix Default	Frame	Suffix Default	Frame
3…60	TGM	G6C3	THM	H6C3	THX	H0C3	TJU	J15F3
85	THM	H6F3	-----	------	THX	H0C3	TJU	J15F3
108	THM	H6F3	-----	------	THX	H0F3	TJU	J15F3
135	TJM	J6F3	-----	------	TJX	J0F3	TKU	K15H3
201	TJM	J6F3	-----	------	TJX	J0F3	TKU	K15H3
251	TKM	K6H3	-----	------	TKX	K0H3	TKU	K15H3
361	TKM	K6H3	-----	------	TKX	K0H3	-----	------
480	TMM	M6H3	-----	------	TMX	M0H3	-----	------

Table 279 - Circuit Breaker Type for Bulletins 2163Q, 2163R, 2163T, 2163U, 2163V, 2163W, and 2163X(1)

Bulletin	Voltage	Duty	Load Rating	High Interrupting Capacity 100 kA at 240V 65 kA at 480V				Extra High Interrupting Capacity 100 kA at 480V 35 kA at 600V			Ultra High Interrupting Capacity 100 kA at 600V	
		Frame/ Suffix		TGM	THM	TJM	TKM	THX	TJX	TKX	TJU	TKU
2163Q	380…415	Normal	KW	.37…30	.37…37			.37…37			(2)	
	480	Normal	Hp	.5…40	.5…60			.5 …60				
	480	Heavy	Hp	.5…40	.5…50			.5…50				
	600	Normal	Hp					1…60				
	600	Heavy	Hp					1…50				
2163R	380…415	Normal	KW	.37…30	.37…37	45…90		.37…37	45…90			
	480	Normal	Hp	.5…40	.5…60	60…150	125…200	.5…60	60…150	125…200		
	480	Heavy	Hp	.5…40	.5…60	60…200	150…200	.5…60	60…200	150…200		
	600	Normal	Hp			60…150	100…150	1…60	60…150	100…150		
	600	Heavy	Hp			75…200	150	1…60	75…200	150		
2163T	380…415	Normal	KW									
	480	Normal	Hp	.5…15	.5…15			.5…15				
	600	Normal	Hp					.75…15				
2163U	480	Normal	Hp	10…50	10…50	60…150	125…200	10…50	60…150	125…200	(3)	
	480	Heavy	Hp	1…50	1…50	60…150	125…150	1…50	60…150	125…150		
	600	Normal	Hp					1…50	60…150	125…150		
	600	Heavy	Hp					0.5…50	60…125	125		
2163V	480	Normal	Hp	10…50	10…50	60…150	125…200	10…50	60…150	125…200		
	480	Heavy	Hp	1…50	1…50	60…150	125…150	1…50	60…150	125…150		
	600	Normal	Hp					1…50	60…150	125…150		
	600	Heavy	Hp					0.5…50	60…125	125		
216W	480	Normal	Hp	.5…20	.5…20			.5…20			(2)	
	600	Normal	Hp					.5…20				
2163X	480	Normal	Hp	.5…20	.5…20			.5…20				
	600	Normal	Hp					.5…20				

(1) Refer to the CENTERLINE 2100 Motor Circuit Protection Technical Data, publication 2100-TD032, for more information.

(2) Fusing is required, so T_U is not needed.

(3) This drive is not yet rated for 600V usage, therefore, there is no need to use T_U breakers.

Hardware and Kits

Section Hardware and Kits for Field Installation

Table 280 - Section Hardware and Kits

Description				Catalog Number	Delivery Program
Drip Hood **IMPORTANT:** NEMA Types 1, 1 with gasket and 12 with drip hood fulfill NEMA Type 2 requirements	Drip hood for NEMA Type 1, 1 w/ gasket and 12. Drip hood is an overhang on top of a section. It provides protection from limited amounts of liquid or dirt dripping and/or running down the front of a section. Select one drip hood per section. Drip hoods fit 15″ and 20″ deep sections.		10″ wide	2100H-DH10	SC
			20″ wide	2100H-DH20	
			25″ wide	2100H-DH25	
			30″ wide	2100H-DH30	
			35″ wide	2100H-DH35	
			40″ wide	2100H-DH40	
Pullbox	12'' high x 20'' wide	For 15'' deep sections	NEMA Type 1 and Type 1 w/gasket	2100H-N2A1	
			NEMA Type 12	2100H-N2J1	
		For 20'' deep sections	NEMA Type 1 and Type 1 w/gasket	2100H-N2A2	
			NEMA Type 12	2100H-N2J2	
	12'' high x 25'' wide	For 15'' deep sections	NEMA Type 1 and Type 1 w/gasket	2100H-N2AA1	
			NEMA Type 12	2100H-N2AJ1	
		For 20'' deep sections	NEMA Type 1 and Type 1 w/gasket	2100H-N2AA2	
			NEMA Type 12	2100H-N2AJ2	
Top Horizontal Wireway Pan	For locating units with handle interlocks in the topmost space factor of a vertical section	For use on Series A through E vertical sections	NEMA Type 1	2100H-NA4A1	
			NEMA Type 1 w/gasket and Type 12	2100H-NA4J1	
		For use on Series F through current series sections	NEMA Type 1	2100H-NA4A2	
			NEMA Type 1 w/gasket and Type 12	2100H-NA4J2	
Horizontal Wireway Cover	Covers either top or bottom wireway opening at front of vertical section		For 20'' wide vertical section	2100H-NWW20	
			For 25'' wide vertical section	2100H-NWW25	
			For 30'' wide vertical section	2100H-NWW30	
			For 35'' wide vertical section	2100H-NWW35	
			For 40'' wide vertical section	2100H-NWW40	

Table is continued on the next page.

Table 280 - Section Hardware and Kits

Description				Catalog Number	Delivery Program
End Closing Plate	Covers both top and bottom horizontal wireway openings and bus opening on one side of vertical section only. For use with sidesheets having internal c-channel mounting angle.	For 15" deep sections	NEMA Type 1 and Type 1 w/gasket	2100H-N3A1	SC
			NEMA Type 12	2100H-N3J1	
		For 20" deep sections	NEMA Type 1 and Type 1 w/gasket	2100H-N3A2	
			NEMA Type 12	2100H-N3J2	
End Closing Plates for Right Hand Sections with Integral Mounting Flanges	Covers both top and bottom horizontal wireway openings and bus opening on one side of vertical section only. For use with sidesheets having internal c-channel mounting angle.	For 15" deep sections	NEMA Type 1 and Type 1 w/gasket	2100H-ECP1A(2)	
			NEMA Type 12	2100H-ECP1J(2)	
		For 20" deep sections	NEMA Type 1 and Type 1 w/gasket	2100H-ECP2A(2)	
			NEMA Type 12	2100H-ECP2J(2)	
Bottom Closing Plate	For 20" wide x 15" deep section		NEMA Type 1 or Type 1 w/gasket MCC (non-gasketed plates)	2100H-N1A1	
	For 20" wide x 20" deep section			2100H-N1A2	
	For 15" deep corner section			2100H-N1A1C	
	For 20" deep corner section			2100H-N1A2C	
External Mounting Channel Kits	Two 1.5" x 3" mounting channels for a single section. **IMPORTANT:** Adding an external mounting channel adds 1.5" to height of section.		For 20" wide vertical section	2100H-NMC1	
			For 25" wide vertical section	2100H-NMC2	
			For 30" wide vertical section	2100H-NMC3	
			For 35" wide vertical section	2100H-NMC4	
			For 40" wide vertical section	2100H-NMC7	
			For 15" deep corner section	2100H-NMC5	
			For 20" deep corner section	2100H-NMC6	
Unit Operating Handle Extender	Permits unit operating handle to be located above the NEC 6' 7" handle-to-floor height limitation. Complies with NEC Article 404.8(A) and the UL Standard for Safety UL 845.			2100H-NE1	
Space Heater Kit	200 watt, 120 volt strip heater with thermostat set at 21 °C (70 °F)			2100H-NH1	
	200 watt, 240 volt strip heater with thermostat set at 21 °C (70 °F)			2100H-NH2	
Gasketing Kit(1)	Gasketing to cover the section perimeter of two 1.0 space factor doors or one 1.5 through 5.0 space factor doors. For units mounted in series A through D sections.			2100H-GJ10	

(1) Cannot be air shipped.

(2) Kits come with three plates: one flat plate and two with formed edges.

Bus Kits, Splices, and Bus Isolation Hardware for Field Installation

Table 281 - Bus Kits, Splices and Bus Isolation Hardware

Description			Catalog Number	Delivery Program
Vertical Wireway Tie Bar	For use on vertical sections series C or later, with or without a vertical wireway. Includes five vertical wireway tie bars. Mounts on right-hand sidesheet for sections with vertical wireway. Mounts on right-hand and/or left-hand sidesheets for sections without vertical wireway.		2100H-WWTB	SC
Wiring Diagram Holder Kit	For a central location of all wiring diagrams. Includes wiring diagram clip, clip location identification label for outside of section and mounting instructions.		2100H-WDH	
Touch-Up Paint [1]	ANSI 49 medium light gray, 12 oz. spray can (cannot be used for NEMA Type 3R enclosures)		2100H-NP1	
Vertical Ground Bus Kit	Contains vertical ground bus, hardware, and installation instructions	Zinc plated steel	2100H-GS1	
	Contains vertical ground bus, six unit plug-in stabs, hardware, and installation instructions	Unplated copper	2100H-N79U	
		Tin plated copper	2100H-N79UT	
Vertical Unit Load Ground Bus Kit	Contains vertical ground bus, six unit load connectors, hardware, and installation instructions	Unplated copper	2100H-N79L	
		Tin plated copper	2100H-N79LT	
Unit Load Ground Kit	Hardware for connecting unit load ground wires to horizontal ground bus. Kit consists of two, #14 AWG to #4 AWG, lugs and hardware. Horizontal ground bus can accommodate up to six 2100H-UG1 kits.		2100H-UG1	
Horizontal Power Bus Splice Kit	Splice bars, hardware, and installation instructions for 3-phase splicing of NEMA Enclosure Type 1, Type 1 with gasket and Type 12 sections. One kit required per shipping split on front mounted lineups, two for back-to-back.	For 600 A aluminum, tin plated bus	2100H-NAT06	
		For 800 A aluminum, tin plated bus	2100H-NAT08	
		For 600 A copper, tin plated bus	2100H-NCT06	
		For 800 A copper, tin plated bus	2100H-NCT08	
		For 1200 A copper, tin plated bus	2100H-NCT12	
		For 1600 A copper, tin plated bus	2100H-NCT16	
		For 2000 A copper, tin plated bus	2100H-NCT20	
	Splice bars, hardware and installation instructions for 3-phase splicing of NEMA Type I, Type I with gasket and Type 12 sections. One of the sections has horizontal power bus 5″ deeper then normal (Bumped-back Bus)	For 600 A aluminum, tin plated bus	2100H-ZAT06	
		For 800 A aluminum, tin plated bus	2100H-ZAT08	
		For 600 A copper, tin plated bus	2100H-ZCT06	
		For 800 A copper, tin plated bus	2100H-ZCT08	
		For 1200 A copper, tin plated bus	2100H-ZCT12	
		For 1600 A copper, tin plated bus	2100H-ZCT16	
		For 2000 A copper, tin plated bus	2100H-ZCT20	
Horizontal Ground Bus Splice Kit	One splice bar per kit, complete with hardware and installation instructions. One kit required per shipping split on front mounted lineups, two for back-to-back.	For 0.25'' x 1'' unplated copper bus	2100H-NC1	
		For 0.25'' x 2'' unplated copper bus	2100H-NC2	
		For 0.25'' x 1'' tin plated copper bus	2100H-NTC1	
		For 0.25'' x 2'' tin plated copper bus	2100H-NTC2	
NO-OX-ID[1]	NO-OX-ID compound for bus bars and plug-in stabs	1-pint can	2100H-N18	
		1-ounce tube	2100H-N18T	

Table is continued on the next page.

Table 281 - Bus Kits, Splices and Bus Isolation Hardware

Description			Catalog Number	Delivery Program
Neutral Connection Plate Kit (2)	0.25'' x 2'' x 12'' copper tin plated bus plate with #6-250 kcmil lug (280 A capacity)	Insulated from and mounted on top of horizontal wireway pan.	2100H-NPC1	SC
		Insulated from and mounted to unit support pan for blank unit space. **Blank door not included.** Select on page 136.	2100H-NPC2	
		Insulated from and mounted on bottom horizontal wireway pan	2100H-NPC3	
	0.25'' x 2'' x 12'' copper silver plated bus plate with #6-250 kcmil lug (280 A capacity)	Insulated from and mounted on top of horizontal wireway pan	2100H-NPS1	
		Insulated from and mounted to unit support pan for blank unit space. **Blank door not included.** Select on page 136.	2100H-NPS2	
		Insulated from and mounted on bottom horizontal wireway pan	2100H-NPS3	
Bus Stab Isolation Kit	Protective caps—for unused plug-in stab openings. 36 per package.		2100H-N1	
	Manual shutters—for isolation of plug-in stab openings. 12 per package. Available for use on vertical sections, series G through current series.		2100H-SM1	
	Automatic shutters—for isolation of plug-in stab openings. 12 per package. Available for use on vertical sections, series G through current series.		2100H-SA1	
Unit Isolating Barriers	For closing the wire opening between unit and vertical wireway. 6 per package. Series K and later structures.		2100H-N2K	

(1) Cannot be air shipped.

(2) A neutral connection plate can be used only in sections with a vertical wireway. Not for use in sections with full width frame mounted units, including all mains.

Lugs for Field Installation

- Hardware not included.
- One lug per kit.
- For use on:
  - Bulletin 2191 Mains and Feeders
  - Bulletin 2192 400 A Disconnect with Optional Lug Pad Assembly(1)
  - Bulletin 2192 600…1200 A Bolted Pressure Switches
  - Bulletin 2193 with Optional Lug Pad Assembly(1)

Table 282 - Lugs

Description				Figure #	Catalog Number	Delivery Program
Lugs for Incoming Line Provisions (2-hole standard NEMA 1-3/4" spacing for 1/2" hardware) One Lug per Kit	Mechanical Lugs (for use with 42 kA bus bracing only when used with main or feeder lug compartment, Bulletin 2191M or 2191F)	#6-350 kcmil	CU/AL	1	2100H-80350	SC
		#6-350 kcmil (double barrel lug) For use on 600 A incoming line lug compartments only (1)	CU/AL	2	2100H-80350DB	
		#4/0-600 kcmil	CU/AL	1	2100H-80600	
		#4/0-600 kcmil (double barrel lug) For use on 600 A incoming line lug compartments only (1)	CU/AL	2	2100H-80600DB	
		350-800 kcmil	CU/AL	1	2100H-80800	
	Crimp Lugs (Panduit Type LCC)	250 kcmil	CU	3	2100H-82250	
		350 kcmil	CU	3	2100H-82350	
		500 kcmil	CU	3	2100H-82500	
		750 kcmil	CU	3	2100H-82750	
	Crimp Lugs (Burndy YA-A series)	250 kcmil	CU/AL	3	2100H-83250	
		350 kcmil	CU/AL	3	2100H-83350	
		500 kcmil	CU/AL	3	2100H-83500	
		750 kcmil	CU/AL	3	2100H-83750	
Incoming Line Lug Barriers	Insulating barrier for covering user's terminations in main bus lug compartments	1.0 space factor			2100H-NLB10	
		1.5 space factor			2100H-NLB15	
		2.0 space factor			2100H-NLB20	

(1) NOT for use on incoming neutral bus. Use single conductor lug for incoming neutral bus applications.

(1) The lugs can only be used if the Bulletin 2192 400 A or Bulletin 2193 unit has been ordered with a factory installed lug pad assembly, for example, option code -82B500

Table 283 - Lug Dimensions

Lug Size	Number of Cables Per Lug	Dimension 'A'	Refer to Figure
Mechanical Type			
#6-350 kcmil	1	2.13″ (54 mm)	1
#4/0-600 kcmil	1	2.31″ (59 mm)	1
350-800 kcmil	1	2.25″ (57 mm)	1
#6-350 kcmil	2	2.13″ (54 mm)	2
#4/0-600 kcmil	2	2.13″ (54 mm)	2
Crimp Type - CU (Panduit Type LCC)			
250 kcmil	1	2.94″ (75 mm)	3
350 kcmil		3.38″ (86 mm)	
500 kcmil		3.78″ (96 mm)	
750 kcmil		4.63″ (118 mm)	
Crimp Type - CU/AL (Burndy YA-A Series)			
250 kcmil	1	2.91″ (74 mm)	3
350 kcmil		3.69″ (94 mm)	
500 kcmil		4.44″ (113 mm)	
750 kcmil		4.94″ (125 mm)	

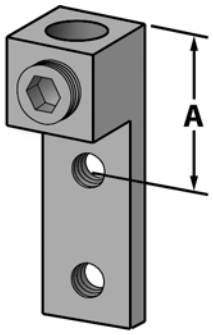


Figure 1

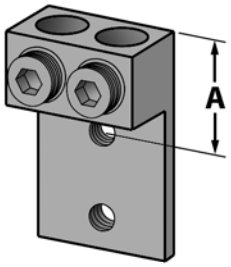


Figure 2

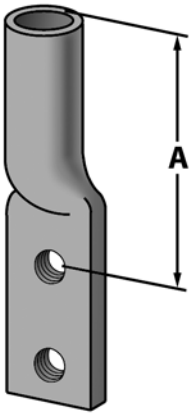


Figure 3

Lugs shown are drilled for 2-hole NEMA 1.75″ spacing.

Unit Hardware and Kits for Field Installation

Table 284 - Unit Hardware and Kits

Description				Catalog Number	Delivery Program
Control Station Housing	Available for use on units series letter H through current series. Housings for series A through G are no longer available.	Blank		2100H-N8	SC
		1 hole—for one Bulletin 800T pilot device		2100H-N9	
		2 hole—for two Bulletin 800T pilot devices		2100H-N10	
		3 hole—for three Bulletin 800T pilot devices		2100H-N11	
Control Station Mounting Plate	Blank (Bulletin 2103L and 2113 dual only)			2100H-N8D	
	1 hole—for one Bulletin 800T pilot device (Bulletin 2103L and 2113 dual only)			2100H-N9D	
	2 hole—for two Bulletin 800T pilot devices (Bulletin 2103L and 2113 dual only)			2100H-N10D	
	3 hole—for three Bulletin 800T pilot devices (Bulletin 2103L and 2113 dual only)			2100H-N11D	
Door Hardware Kit	Includes two door latch assemblies and two door hinge assemblies	Series H or later	1.0 space factor	2100H-NDH2	
			0.5 space factor	2100H-NDH3	
Door Hinge Kit [1]	Includes two hinges and two hinge pins	Series H or later	0.5 space factor door	2100H-NHP1	
		Series E or later	1.0 space factor (or larger) door	2100H-NHP2	
Cardholder for Unit Doors	1.125'' x 3.625'' plastic card holders with blank cards		6 per package	2100H-CH1	

Table is continued on the next page.

Table 284 - Unit Hardware and Kits

Description				Catalog Number	Delivery Program
Unit Door Nameplates	Engravable acrylic (1.125'' x 3.625'') (not available in Canada)	White background with black lettering	Blank (6 per package)	2100H-N3AW	SC
			With legend	2100H-N3EAW	
		Black background with white lettering	Blank (6 per package)	2100H-N3AB	
			With legend	2100H-N3EAB	
	Engravable phenolic (1.125'' x 3.625'')	White background with black lettering	Blank (6 per package)	2100H-N3W	
			With legend	2100H-N3EW	
		Red background with white lettering	Blank (6 per package)	2100H-N3R	
			With legend	2100H-N3ER	
		Black background with white lettering	Blank (6 per package)	2100H-N3B	
			With legend	2100H-N3EB	
Master Nameplates	Engravable phenolic (2″ x 6″)	White background with black lettering	With legend	2100H-N3EMW	
		Black background with white lettering		2100H-N3EMB	
Stainless Steel Nameplate Screws	Stainless steel nameplate screws for door or master nameplates (12 per package)			2100H-SSNS1	
Unit Support Pan	Style 1 for units 1.0 space factor or larger, series A through D sections		NEMA Enclosure Type 1, Type 1 w/gasket and Type 12	2100H-UAJ1	
	Style 3 for units 1.0 space factor or larger, series E through current series (replaces style 2)		NEMA Enclosure Type 1	2100H-UA1	
			NEMA Enclosure Type 1 w/gasket and Type 12	2100H-UJ1	
	Style 3 for units 0.5 space factor, with horizontally-toggled unit operating handles and space-saving NEMA starters, series E through current series (replaces style 2)		NEMA Enclosure Type 1	2100H-USPA1	
			NEMA Enclosure Type 1 w/gasket and Type 12	2100H-USPJ1	

(1) Use the table below for determining the quantity of hinge and hinge pin kits needed.

Table 285 -

Space Factor	Quantity of Kits Needed
0.5	1
1.0	1
1.5	1
2.0	1
2.5	2
3.0	2
3.5	2
4.0	2
4.5	2
6.0	3

Unit Hardware and Kits for Field Installation, *continued*

Table 286 - Unit Hardware and Kits

Description				Catalog Number	Delivery Program
Plug-In Unit Retrofit Kit	Permits installation of 0.5 space factor and NEMA Space Saving starter plug-in units into existing series E through J CENTERLINE 2100 vertical section. Includes hinges, grounding wire and extended unit door latches.		0.5 space factor	2100H-R1	SC
			Greater than 0.5 space factor	2100H-R2	
Unit Insert Extension Kit	Includes 0.5 space factor door and unit extension, 20 pull-apart terminals and hardware to increase usable mounting space of plug-in units	For expanding all 1.0 SF units and Series T and later 1.5 SF units[2]		2100H-NXT05B1	
		For expanding Series R and earlier 1.5 SF units and all 2.0 SF through 3.5 SF units[2]		2100H-NXT05B2	
Unit Door Grounding Kit	Unit door is grounded by a hinge mounted ground wire. Mounts on bottom hinge of unit door.			2100H-GD1	
Extended Reset Button Kit	Mounts externally to existing door overload reset button. Allows reset of overload relays without use of tools	For small 0.38'' reset button screw head. Includes five reset button heads.		2100H-NRB1	
		For large 0.50'' reset button screw head. Includes five reset button heads.		2100H-NRB2	
Pull-Apart Terminal Bocks [1]	Power terminal block	60 A, 3-pole block, accepts #4-#14 AWG wire. Not for use on 0.5 space factor units.		1492-ED103	
	Control terminal block	25 A, 5-pole block, accepts #12-#20 AWG wire. Not for use on 0.5 space factor units.		1492-EC85	
Line Terminal Shield	Transparent polycarbonate wraparound line terminal shield permits visual monitoring of conductors and power terminations. Replaces standard line terminal shield. Not available on 0.5 space factor units.	For 30 A, 60 A, 100 A fusible disconnect. 10 per package.		2100H-NLT26	
		For 200 A fusible disconnect. Series A-M. 5 per package.		2100H-NLT27	
		For 200 A fusible disconnect. Series N and later. 5 per package.		2100H-NLT28	
		For 400 A fusible disconnect. Series N and later. 5 per package.		2100H-NLT29	
External Auxiliary Contact Adapter Kits **FOR FUSIBLE DISCONNECT:** Not for use on 0.5 space factor or dual-mounted units. Auxiliaries are actuated by the unit operating handle.	Permits mounting a maximum of two Bulletin 1495-N8 (normally open) or 1495-N9 (normally closed) auxiliary contacts on the unit operating mechanism, external to the disconnect.	For units with 30 A, 60 A, 100 A, or 200 A fusible disconnects.	Units Series A…N	None required	
		For units with 400 A fusible disconnects.	Unit Series A…C	1495-N16	
			Unit Series D…M	595-N1 [3]	
			Unit Series N	None required	
		For units with 600 A or 800 A fusible disconnects.	Unit Series C…L	1495-N13	
	Permits mounting a maximum of two Bulletin 2100H-N19 (normally open) or 2100H-N20 (normally closed) auxiliary contacts on the unit operating mechanism, external to the disconnect.	For units with 30 A, 60 A, 100 A, 200 A or 400 A fusible disconnects.	Unit Series Q and later	2100H-N21	

The table is continued on the next page.

Table 286 - Unit Hardware and Kits

Description				Catalog Number	Delivery Program
External Auxiliary Contact	One Normally Open	Must be used with external auxiliary adapter kit	Unit Series Q or later	2100H-N19	SC
	One Normally Closed			2100H-N20	
FOR BOLTED PRESSURE SWITCHES: For 2192F and 2192M 600A, 800A and 1200A units.	Mounts one form C auxiliary contact on the operating mechanism, external to the bolted pressure switch		Unit Series Q and later	2100H-N26A	
	Mounts two form C auxiliary contacts on the operating mechanism, external to the bolted pressure switch			2100H-N26B	

(1) Plug-in units have provision for a maximum of four pull-apart terminal blocks (any combination of 3-pole or 5-pole blocks). Not available on 0.5 space factor units.
(2) 1.5 space factor Bulletin 2193F with 225 A frame breakers, use kit 2100H-NXT05B2.
(3) Kit permits mounting of two Bulletin 595-A (normally open) or 595-B (normally closed) auxiliary contacts only. Not compatible with Bulletin 1495-NB or 1495-NP auxiliary contact kits.

Table 287 - Unit Hardware and Kits (continued)

Description				Catalog Number	Delivery Program
External Auxiliary Contact Kits	**FOR CIRCUIT BREAKERS: For 0.5 space factor units.** Auxiliaries are actuated by the unit operating handle only and will not reflect a circuit breaker trip	Mounts one form C auxiliary contact on the operating mechanism, external to the breaker. Allen-Bradley G, H, J, K, M, N, and R Frame.	Unit Series P…Y	2100H-N18A	SC
		Mounts two form C auxiliary contacts on the operating mechanism, external to the breaker. Allen-Bradley G, H, J, K, M, N, and R Frame.		2100H-N18B	
	FOR CIRCUIT BREAKERS: For dual 2103, 2113, and 2193F units	Mounts one form C auxiliary contact on the operating mechanism, external to the breaker. Allen-Bradley G, H, J, K, M, N, and R Frame.	Unit Series Q…Y	2100H-N25A	
		Mounts two form C auxiliary contacts on the operating mechanism, external to the breaker. Allen-Bradley G, H, J, K, M, N, and R Frame.		2100H-N25B	
External Auxiliary Contact Adapter Kits **FOR CIRCUIT BREAKERS:** Not for use on 0.5 space factor units. Auxiliaries are actuated by the unit operating handle only and will not reflect a circuit breaker trip.	Permits mounting a maximum of two Bulletin 1495-N8 (normally open) or 1495-N9 (normally closed) auxiliary contacts on the unit operating mechanism, external to the circuit breaker	For units with dual circuit breakers only. Allen-Bradley G, H, J, K, M, N, and R Frame.	Unit Series K…N	2100H-N16	SC
		For units with single circuit breakers only. Allen-Bradley G, H, J, K, M, N, and R Frame.		2100H-N17	
		For units with 250 A J-Frame and 400A K-Frame.	Unit Series C…G	1495-N16	
		For units with Cutler-Hammer .	Unit Series C…N	1495-N13	
		For units with Cutler-Hammer 800 A M-Frame.	Unit Series C…N		
		Allen Bradley G-R Frame MCPs.	Unit Series N		
	Permits mounting a maximum of two normally open (2100H-N19) or normally closed (2100H-N20) auxiliary contacts on the unit operating mechanism, external to the circuit breaker	For units with single circuit breakers only. Allen-Bradley Frames G-K	Units Series Q…Y	2100H-N22	
		For units with Allen-Bradley Frames M-R.	Unit Series Q…Y	2100H-N23	

Table 288 - Unit Hardware and Kits (continued)

Description		1-Pole 120/240V AC, 10 kA rms symmetrical interrupting capacity	2-Pole 120/240V AC, 10 kA rms symmetrical interrupting capacity	3-Pole 120/240V AC, 10 kA rms symmetrical interrupting capacity	Delivery Program
		Catalog Number	Catalog Number	Catalog Number	
Bolt-on Inverse Time (Thermal Magnetic) Branch Breakers for Lighting Panels (2193LE) (1)	15 A	2100-B1015	2100-B2015	2100-B3015	SC
	20 A	2100-B1020	2100-B2020	2100-B3020	
	30 A	2100-B1030	2100-B2030	2100-B3030	
	15 A w/ground fault	2100-B1015G	—	—	
	20 A w/ground fault	2100-B1020G	—	—	
	50 A	—	2100-B2050	2100-B3050	
	100 A	—	2100-B2100	2100-B3100	
	Filler plates (10 per package)	2100-FILLER	—	—	
		1-Pole 277V AC, 14 kA rms symmetrical interrupting capacity	2-Pole 480Y/277V AC, 14 kA rms symmetrical interrupting capacity	3-Pole 480Y/277V AC, 14 kA rms symmetrical interrupting capacity	
Inverse Time (Thermal Magnetic) Branch Breakers for Panel Board Plug-In Unit (2193PP) (2)	15 A	2100-GHB1015	2100-GHB2015	2100-GHB3015	PE
	20 A	2100-GHB1020	2100-GHB2020	2100-GHB3020	
	25 A	2100-GHB1025	2100-GHB2025	2100-GHB3025	
	30 A	2100-GHB1030	2100-GHB2030	2100-GHB3030	
	35 A	2100-GHB1035	2100-GHB2035	2100-GHB3035	
	40 A	2100-GHB1040	2100-GHB2040	2100-GHB3040	
	50 A	2100-GHB1050	2100-GHB2050	2100-GHB3050	
	60 A	2100-GHB1060	2100-GHB2060	2100-GHB3060	
	70 A	2100-GHB1070	2100-GHB2070	2100-GHB3070	
	80 A	2100-GHB1080	2100-GHB2080	2100-GHB3080	
	90 A	2100-GHB1090	2100-GHB2090	2100-GHB3090	
	100 A	2100-GHB1100	2100-GHB2100	2100-GHB3100	
	Filler plates (10 per package)	2100-FILLER	—	—	SC

(1) Bolt-on branch breaker frame type for lighting panel boards is BAB.

(2) Bolt-on branch breaker frame type for plug-in panel board unit is GHB.

Table 289 - Unit Hardware and Kits (continued)

Description	Frame Size	Style	Catalog Number	Delivery Program
140G Handle Repair Kit - includes handle, mounting base, bail, and hardware	G	Right	2100H-HOAGR	SC
		Left	2100H-HOAGL	SC
		Horizontal	2100H-HOAGH	SC
	H	Right	2100H-HOAHR	SC
		Left	2100H-HOAHL	SC
		Horizontal	2100H-HOAHH	SC
	J	Right	2100H-HOAJR	SC
		Horizontal	2100H-HOAJH	SC
	K	Right	2100H-HOAKR	SC
	M	2193 Mains and Feeders	2100H-HOAM2	SC
		Frame Mount	2100H-HOAMF	SC
	N	Right	2100H-HOANR	SC

Network Hardware and Kits for Field Installation

Table 290 - Network Hardware and Kits

Description			Catalog Number	Delivery Program (2)
DeviceNet Scanner Modules	DeviceNet scanner module for Bulletins 2180E, 2182E, and 2183E	For Bulletin 1771 I/O chassis	1771-SDN	(2)
	DeviceNet scanner module for Bulletins 2180J, 2182J, and 2183J	For SLC 500 chassis	1747-SDN	(2)
	DeviceNet scanner module for Bulletins 2180L, 2182L, and 2183L	For Bulletin 1756 chassis	1756-DNB	(2)
MCC DeviceNet Terminating Resistor Kit	Includes the necessary DeviceNet connectors and resistors to terminate the DeviceNet cable system in a motor control center. IMPORTANT: if terminating resistors are not used, the DeviceNet cable system will not operate correctly. This kit is shipped with each DeviceNet motor control center.		2100H-DNTR1	SC
DeviceNet Terminating Resistors	Two 120 ohm, 5% terminating a DeviceNet trunk cable. IMPORTANT: if terminating resistors are not used, the DeviceNet cable system will not operate correctly.		1485A-C2	(2)
Double DeviceNet Connector	Allows two DeviceNet cables to be independently connected to a single DeviceNet port in the MCC vertical wireway.		1485P-P1J5-UU5	(2)
DeviceNet Connection Cover Kit	For covering unused DeviceNet connectors in the vertical wireway of a DeviceNet MCC. 6 per package.		2100H-DNCC1	SC
DeviceNet Unit Cable	Cable used for connecting DeviceNet MCC units to the DeviceNet ports in vertical wireway. Includes cable and one connector on each end of the cable.	18 in. (45.7 cm)	2100H-DNUC18	
		36 in. (91.4 cm)	2100H-DNUC36	
		60 in. (152.4 cm)	2100H-DNUC60	
Round DeviceNet Cable with Connectors	8 A round DeviceNet cable with one connector on each end for connecting a laptop computer to a DeviceNet port in an IntelliCENTER or DeviceNet MCC	10 ft. (305 cm)	2100H-ICPC120	
DeviceNet Trunk Line Cable (1)	8 A flat DeviceNet cable used for trunk lines	246 ft. (75 m)	1485C-P1E75	(2)
8A Round DeviceNet Cable (1)	8 A round DeviceNet cable used for drop lines	164 ft. (50 m)	2100H-DNRC1	SC
	8 A round DeviceNet cable uses for extending the trunk line beyond the MCC. Class I, shielded cable	246 ft. (75 m)	1485C-P1BS75	(2)
DeviceNet Field Support Kit	Includes an assortment of DeviceNet-related components that aid in starting up DeviceNet systems, commissioning DeviceNet nodes, testing DeviceNet devices and training on DeviceNet. See the Field Support Kit for CENTERLINE MCCs with IntelliCENTER Technology, publication MCC-TD001, for complete information.		2100H-DFSK2	SC
DeviceNet Backup Power Supply	Provides an alternative source of DC power to supply power to devices such as E3 electronic overload relays in the event of loss of normal network power. For more information refer to publication 2100-TD022		2100-DNBPS	
Ethernet Patch Cord	Teal 600V PLTC, used for internal MCC connections. Can be used for external MCC Connections. Replace '*' with length desired. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative to ensure valid catalog string or for cables with angled connectors.		1585J-M8HBJM-*	(2)
Stratix Switch	Stratix switch used in standard design for all IntelliCENTER MCC with EtherNet/IP network orders. Other versions are available. Contact your local Allen-Bradley distributor or Rockwell Automation sales representative for details.	6-Port	1783-BMS6TL	(2)
		10-Port	1783-BMS10CL	

(1) Refer to the DeviceNet Media Design and Installation Guide, publication DNET-UM072, for application information.

(2) Contact your local Allen-Bradley distributor or Rockwell Automation sales representative for ordering information.

Appendix

Approximate Dimensions

All 6.0 space factor units are frame mounted and do not have a vertical wireway.

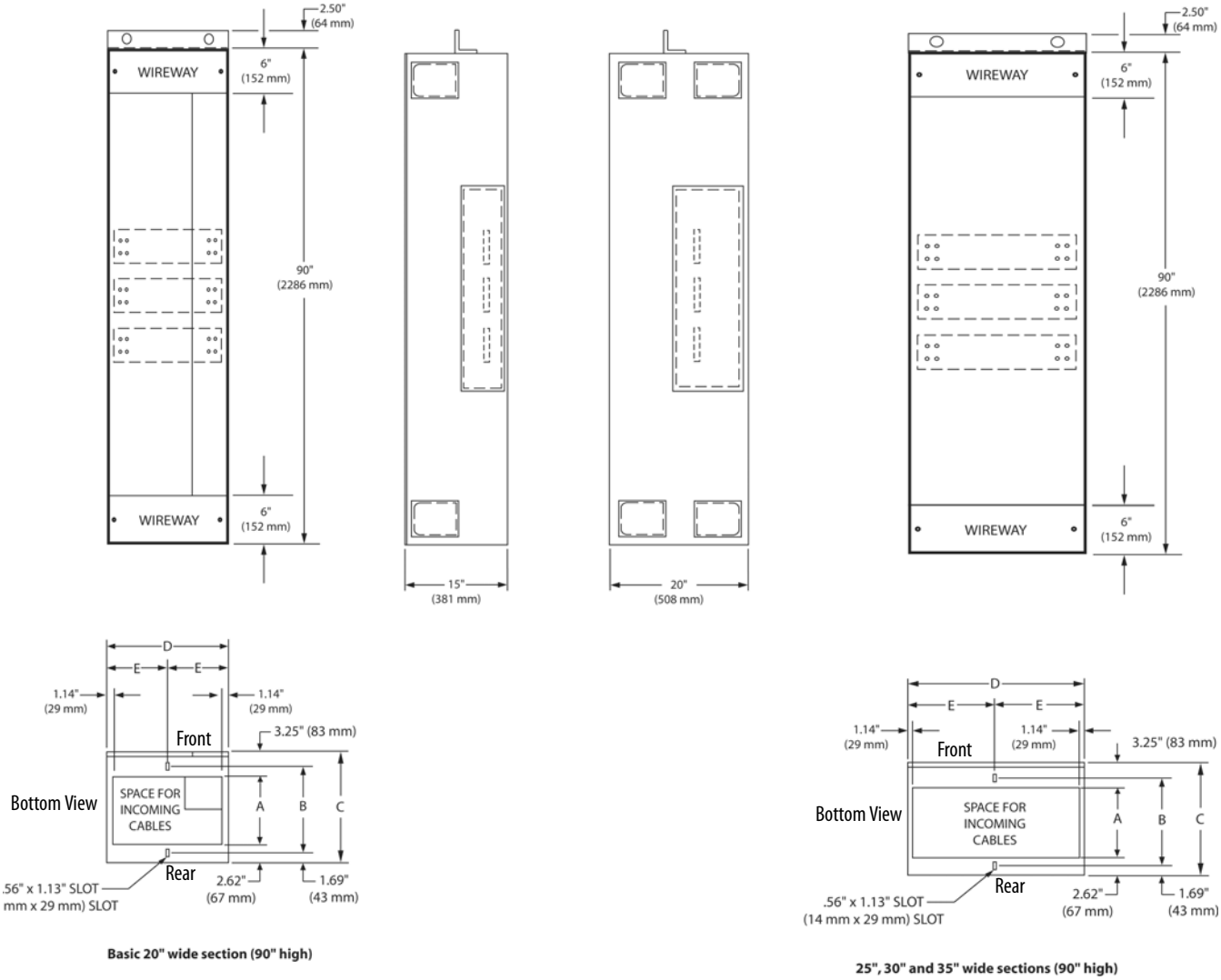
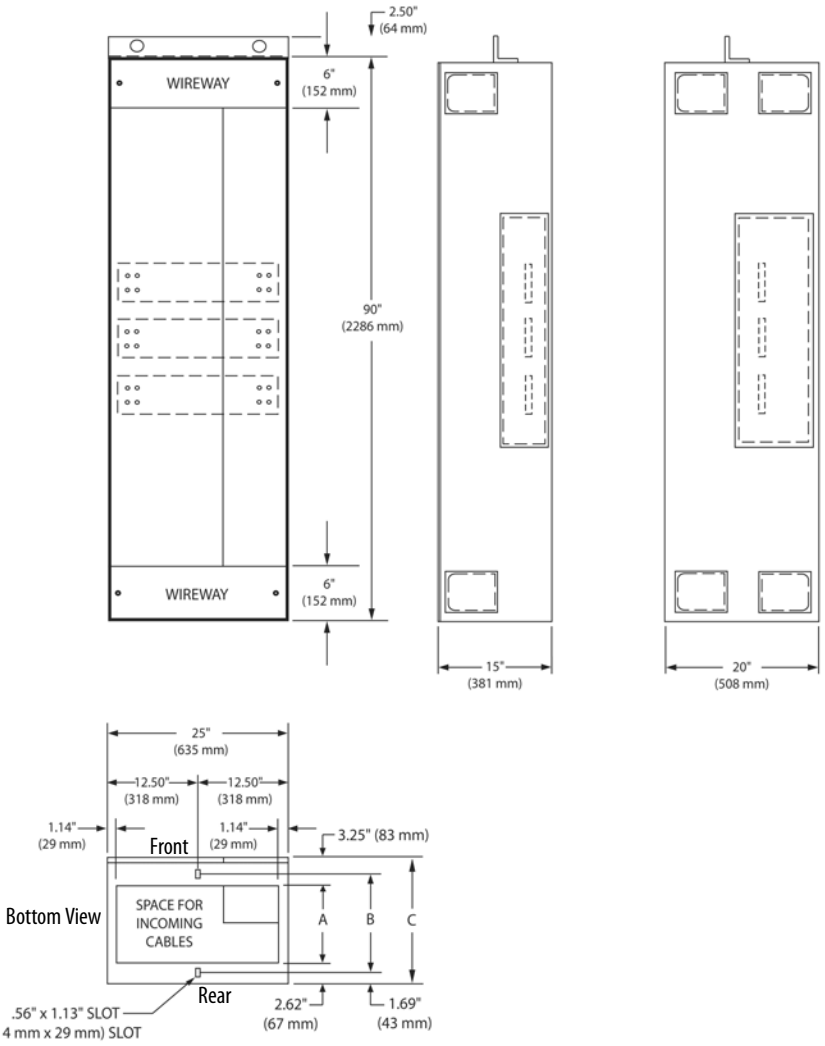


Table 291 - Section Dimensions

Dimension	15" Deep								20" Deep							
	20″ Wide		25″ Wide		30″ Wide		35″ Wide		20″ Wide		25″ Wide		30″ Wide		35″ Wide	
	inch	(mm)	inch	(mm)	inch	(mm)	inch	(mm)	inch	(mm)	inch	(mm)	inch	(mm)	inch	(mm)
A	9.13	(232)	9.13	(232)	9.13	(232)	9.13	(232)	14.13	(359)	14.13	(359)	14.13	(359)	14.13	(359)
B	11.56	(294)	11.56	(294)	11.56	(294)	11.56	(294)	16.56	(421)	16.56	(421)	16.56	(421)	16.56	(421)
C	15.00	(381)	15.00	(381)	15.00	(381)	15.00	(381)	20.00	(508)	20.00	(508)	20.00	(508)	20.00	(508)
D	20.00	(508)	25.00	(635)	30.00	(762)	35.00	(889)	20.00	(508)	25.00	(635)	30.00	(762)	35.00	(889)
E	10.00	(254)	12.50	(318)	15.00	(381)	17.50	(445)	10.00	(254)	12.50	(318)	15.00	(381)	17.50	(445)

IMPORTANT Optional external mounting channels add 1.5″ to height. Refer to page 324 for mounting channels.

25″ Section



10″ Section

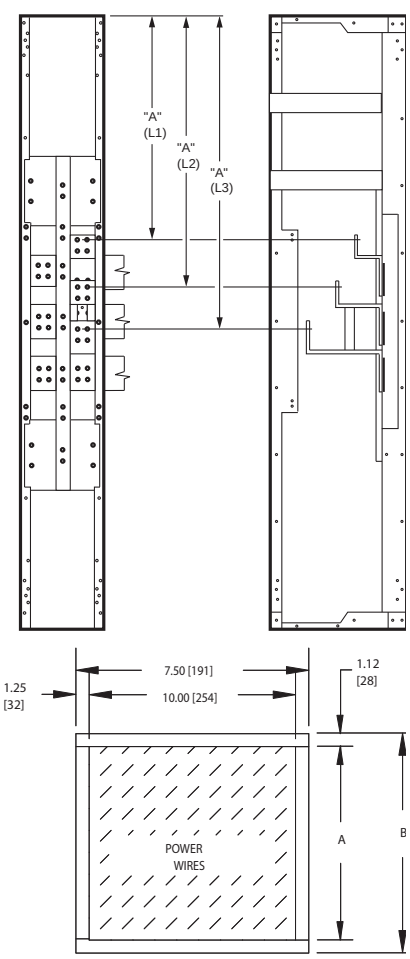


Table 292 - 25″ Wide Section with 9″ Wireway (90″ High)

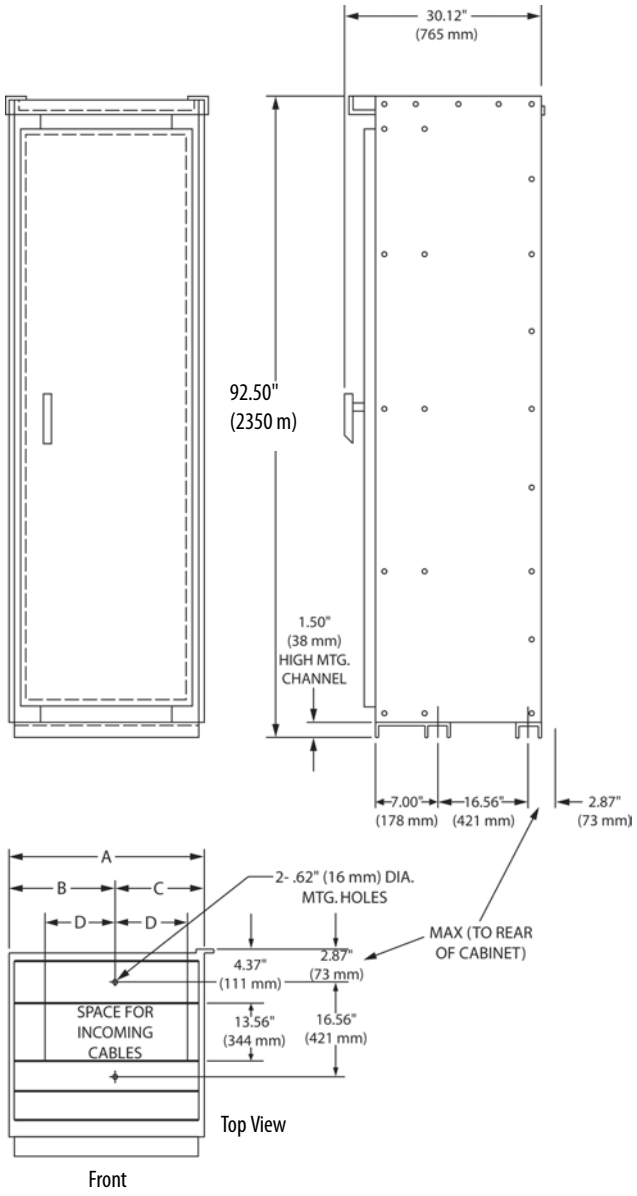
Dimensions	Section Depth			
	15″ Deep		20″ Deep	
	inch	(mm)	inch	(mm)
A	9.13	(232)	14.13	(359)
B	11.56	(294)	16.56	(421)
C	15.00	(381)	20.00	(508)

Table 293 - 10″ Incoming Line Section

Dimensions	Section Depth			
	15″ Deep		20″ Deep	
	inch	(mm)	inch	(mm)
A	12.75	(324)	17.75	(451)
B	14.75	(375)	19.75	(502)

IMPORTANT Optional external mounting channels add 1.5″ to height. Refer to page 324 for mounting channels.

NEMA Type 3R and Type 4 Section (90″ high)



Corner Section (90″ high)

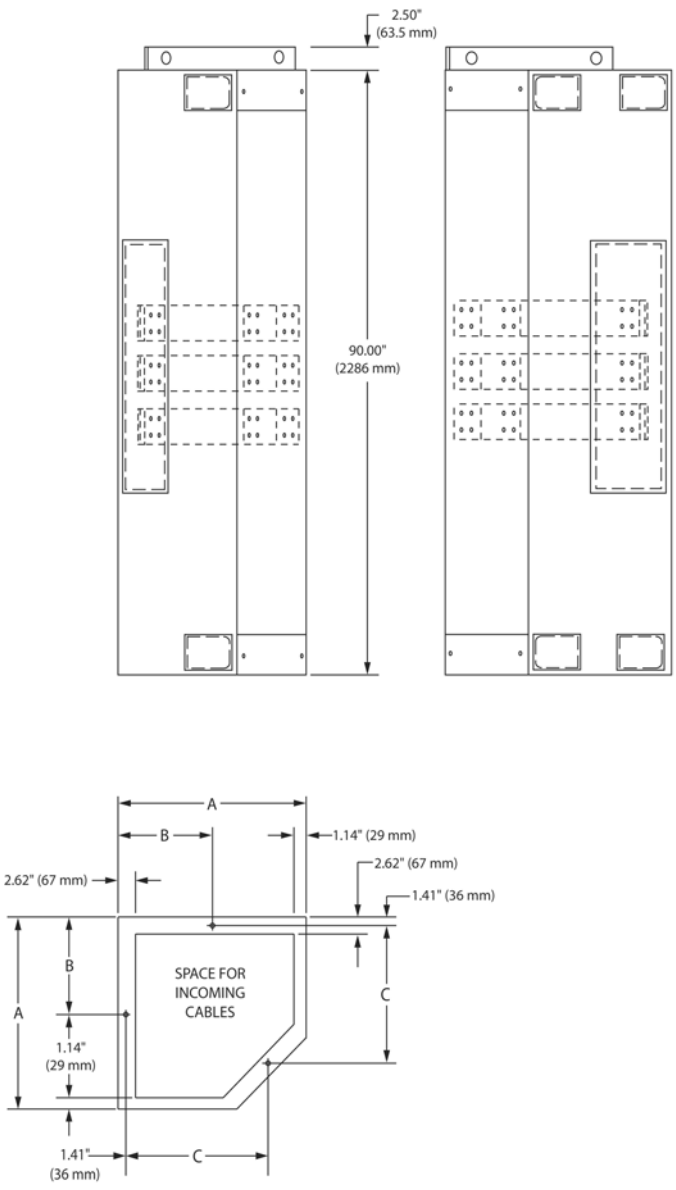


Table 294 -

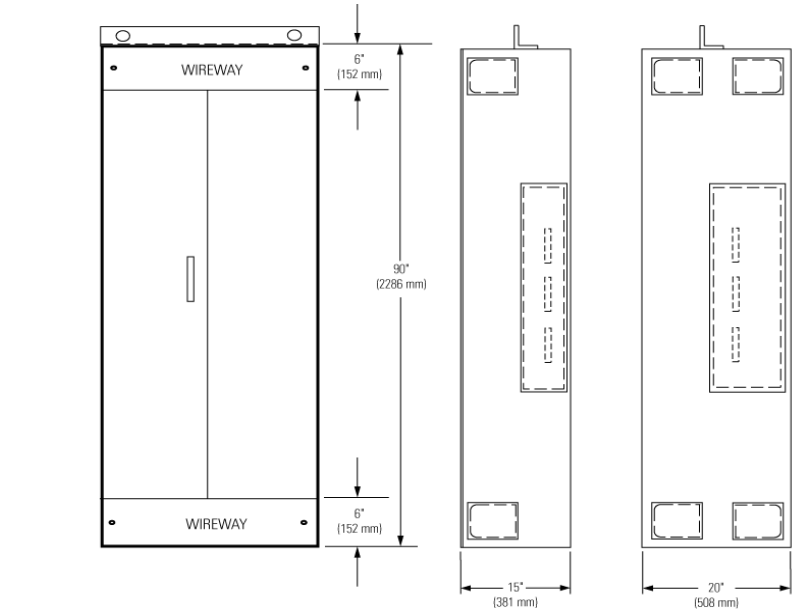
Floor Plan Dimensions	Interior Section Width					
	20″		25″		30″	
	inch	(mm)	inch	(mm)	inch	(mm)
A	25.00	(635)	30.00	(762)	35.00	(889)
B	13.75	(349)	16.25	(413)	18.75	(476)
C	11.25	(286)	13.75	(349)	16.25	(413)
D	8.87	(225)	11.37	(289)	13.87	(352)

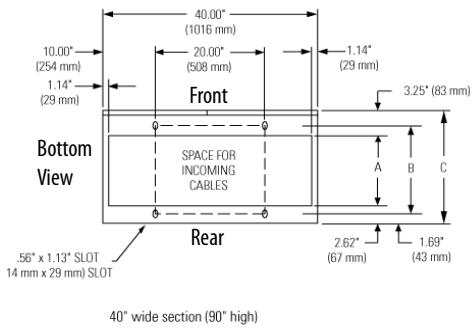
NOTE: Optional non-removable lifting angle add 3.63″ to height.

Table 295 -

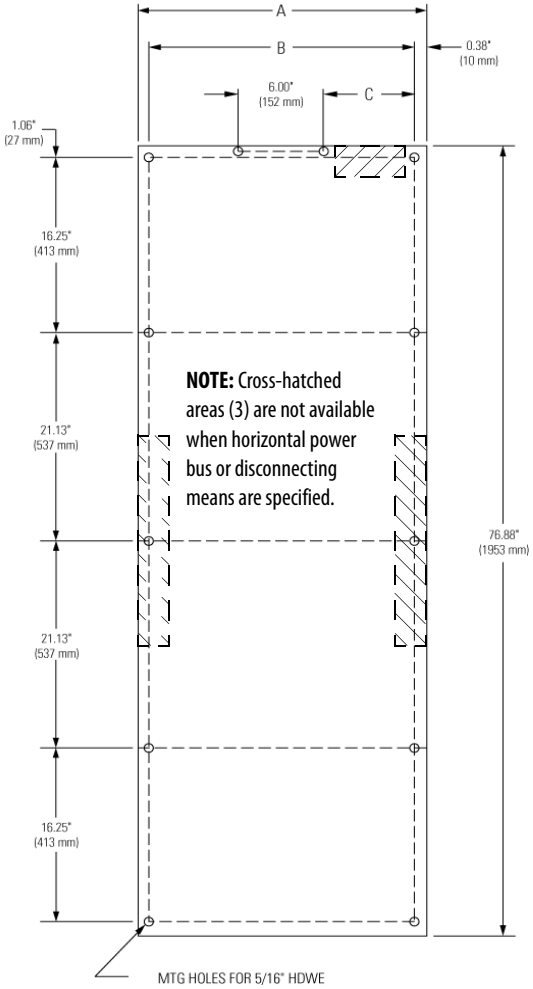
Dimension	Section Depth			
	15″ Deep		20″ Deep	
	inch	(mm)	inch	(mm)
A	25.13	(638)	30.13	(765)
B	12.63	(321)	15.13	(384)
C	16.81	(427)	21.81	(554)

NOTE: Optional external mounting channels add 1.5″ to height. Refer to page 324 for mounting channels.





40" wide section (90" high)



Blank mounting plate

Table 296 - Section Dimensions

Dimension	Section Depth			
	15″ Deep		20″ Deep	
	inch	(mm)	inch	(mm)
A	9.13	(232)	14.13	(359)
B	11.00	(294)	16.56	(421)
C	15.00	(381)	20.00	(508)

Dimension	Section Width									
	20″		25″		30″		35″		40″	
	inch	(mm)	inch	(mm)	inch	(mm)	inch	(mm)	inch	(mm)
A(1)	17.25	(438)	22.25	(565)	27.25	(692)	32.25	(819)	37.25	(946)
B	16.50	(419)	21.50	(546)	26.50	(673)	31.50	(800)	36.50	(927)
C	5.25	(133)	7.75	(197)	10.25	(260)	12.75	(324)	15.25	(387)

(1) When horizontal bus or a disconnecting means (switch or circuit breaker) is specified, the dimension of width in the center of the column is 5" less than A.

IMPORTANT Optional external mounting channels add 1.5″ to height. Refer to page 324 for mounting channels.

71" high column with neutral bus shown in both upper and lower positions

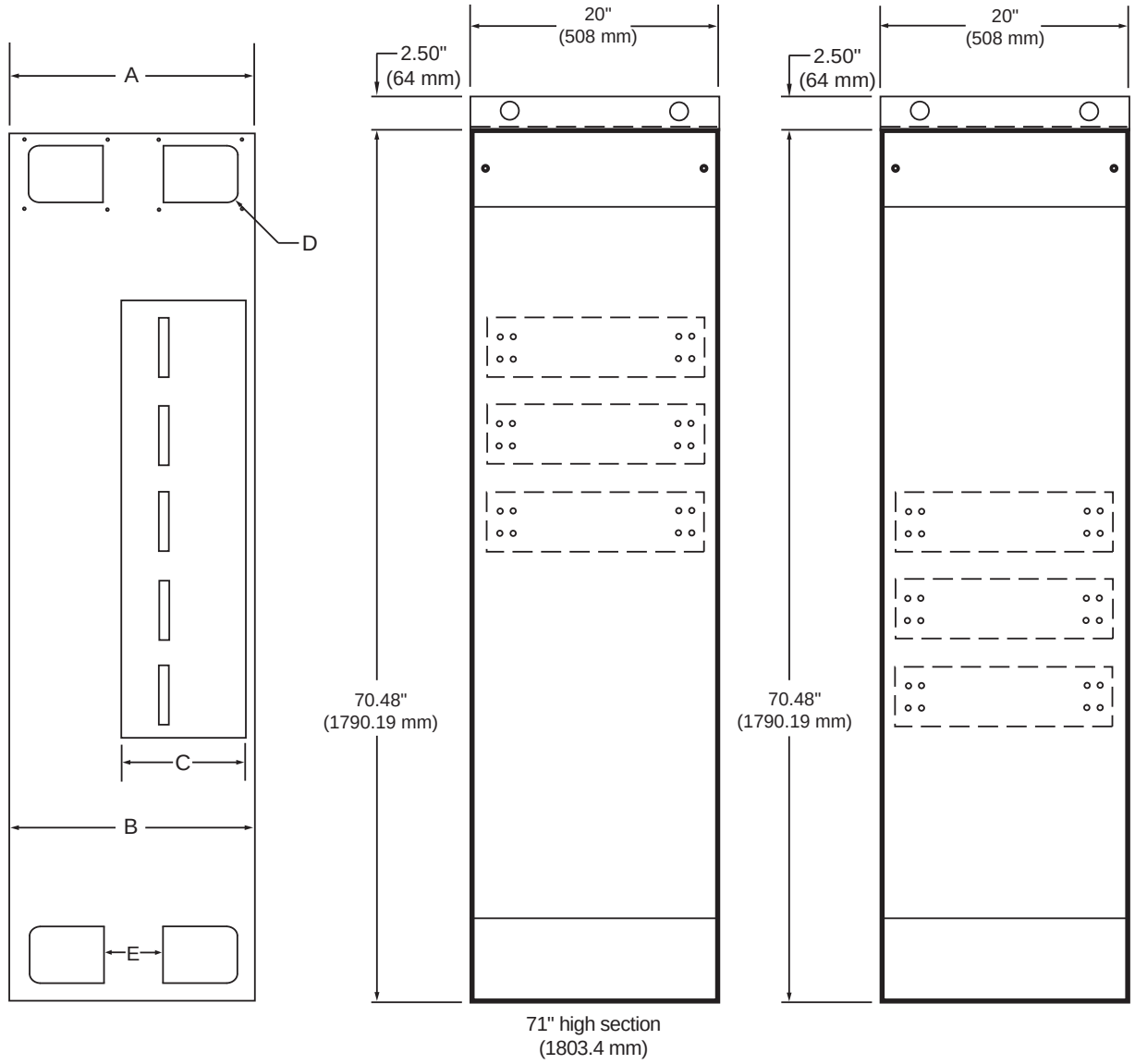


Table 297 - Section Dimensions

Dimensions	Section Depth			
	15″ Deep		20″ Deep	
	inch	(mm)	inch	(mm)
A	15.00	(380)	20.00	(508)
B	14.75	(374)	19.75	(500)
C	5.12	(130)	10.12	(256)
D	4	(101)	8	(203)
E	—	—	4.40	(112)

NOTE: Refer to page 335 for details of cabinet bottom.

Motor Control Center Construction

Table 298 - Structural Specifications

Major Structural Components	Nominal Thickness		Approximate Gauge (AWG)
	inches	mm	
Side Plates	0.075	1.905	14
Reinforcing 'C' Channel	0.09	2.286	13
Backplate 20″ Wide	0.06	1.524	16
Backplate 25″ Wide	0.075	1.905	14
Backplate 30″ - 40″ Wide	0.105	2.667	12
Bottom Mounting Angle	0.134	3.404	10
Right-Hand Unit Support	0.075	1.905	14
Covers and Panels			
Top Plate (all widths)	0.075	1.905	14
Bottom Plate	0.075	1.905	14
External End Plate	0.075	1.905	14
Horizontal Wireway Cover	0.060	1.524	16
Wireway Baffle	0.075	1.905	14
Top Horizontal Wireway Pan	0.060	1.524	16
Doors			
Unit Door (1.0…5.0 Space Factor)	0.075	1.905	14
Unit Door (6.0 Space Factor)	0.105	2.667	12
Vertical Wireway Door	0.060	1.524	16
Other Steel			
Pull Box Parts	0.075	1.905	14
Unit Wrap Around	0.075	1.905	14
Unit Support Pan	0.075	1.905	14

Approximate Weights of CENTERLINE Motor Control Center Sections

Table 299 - Section Weights (approximate)

MCC Section Dimensions	NEMA 1 or 12	NEMA 3R or 4
	Lbs. (kg) per section (1)	Lbs. (kg) per section (1)
15″/20″ D, 20″ W	750 (340)	950 (431)
15″/20″ D, 25″ W	750 (340)	1000 (454)
15″/20″ D, 30″ W	800 (363)	1050 (477)
15″/20″ D, 35″ W	800 (363)	N/A

(1) Weights are based on worst case approximations.

MCC Finish

Table 300 - NEMA Type Finishes

NEMA Type	Finish
1, 1G, 12	ANSI 49, Medium Light Grey
3R	High Gloss White (inside only)

Cross Reference Chart - NEMA/UL to IEC

Table 301 - NEMA/UL/IEC Enclosure Cross-Reference (approximate)

NEMA Type	Compliance to IP Protection Rating(1)																											
	10	20	21	22	23	30	31	32	33	40	41	42	43	50	51	52	53	54	55	56	60	61	62	63	64	65	66	67
1	✓	✓	✓	✓	✓																							
2	✓	✓	✓	✓	✓	✓																						
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
3R	✓	✓	✓	✓	✓	✓	✓	✓																				
3S	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
4X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
13	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

(1) IEC 529 has no equivalent to NEMA enclosure Types 7, 8, 9, 10, or 11.

Table 302 - Degree of Protection Against Foreign Body Entrance

First Digit Number	Protection Description
0	No protection against entrance of solid foreign bodies
1	Protection against entrance of large (>50 mm) solid foreign bodies; accidental contact with a hand
2	Protection against entrance of medium (>12 mm) solid foreign bodies; finger-proof
3	Protection against entrance of small (2.5 mm thick) solid foreign bodies; tools
4	Protection against entrance of small (>1 mm thick) solid foreign bodies; fine tools and wire
5	Protection against the entrance of dust in an amount sufficient to interfere with satisfactory operation of the enclosed equipment.
6	Complete protection against entrance of dust

Second Digit Number	Protection Description
0	No protection
1	Protection against drops of condensed vertically dripping water
2	Protection against drops of liquid falling at any angle up to 15 degrees from vertical
3	Protection against sprayed water at any angle up to 60 degrees from vertical
4	Protection against splashing; liquid splashed from any direction shall have no harmful effect
5	Protection against water projected by a nozzle from any direction
6	Protection against conditions on ship decks
7	Protection against immersion in water
8	Protection against indefinite immersion in water

Heater Element Selection

Overload Relay Class Designations

Industry standard NEMA Part ICS 2-222 designates an overload relay by a class number, indicating the maximum time in seconds at which the relay trips when carrying a current equal to 600% of its current rating.

A class 10 overload relay trips in 10 seconds or less at a current equal to 600% of its rating. Applications include hermetic motors, submersible pumps, and motors with short locked rotor time capability.

A class 20 overload relay trips in 20 seconds or less at a current equal to 600% of its rating. They are often used for applications involving motors driving high inertia loads, where additional accelerating time is needed.

Allen-Bradley standard overload relay protection using type W heater elements provides class 20 operation and is recommended for general applications. For applications regarding class 10 and 30 overload relays, consult your local Allen-Bradley distributor or Rockwell Automation sales representative.

Heater Element Selection

The full-load amps listed in the table are used for heater element selection. The rating of the relay in amperes at 40 °C is 115% of the full-load amps listed for the Heater Element No.

Refer to the motor nameplate for the full load current, the service factor and the motor classification by application and temperature rise.

Use this motor nameplate information, the application rules and the full-load amps listed in the tables to determine the Heater Element No.

Motors Rated For Continuous Duty

Motors with marked service factor not less than 1.15 or motors with a marked temperature rise not over 40 °C

1. The same temperature at the controller and motor — Select the heater element number with the listed full-load amps nearest the full-load value shown on the motor nameplate. This provides integral horsepower motors with protection between 110…120% of the nameplate full-load amps.
2. Higher temperature at the controller than at the motor(1) — If the full-load amps value shown on the motor nameplate is between the listed full-load amps, select the heater element number with the higher value. This provides integral horsepower motors with protection between 115…125% of the nameplate full-load amps.
3. Lower temperature at the controller than at the motor — If the full-load amps value shown on the motor nameplate is between the listed full-load amps, select the heater element number with the lower value. This provides integral horsepower motors with protection between 105…115% of the nameplate full-load amps.

All other motors rated for continuous duty (includes motors with marked service factor of 1.0)

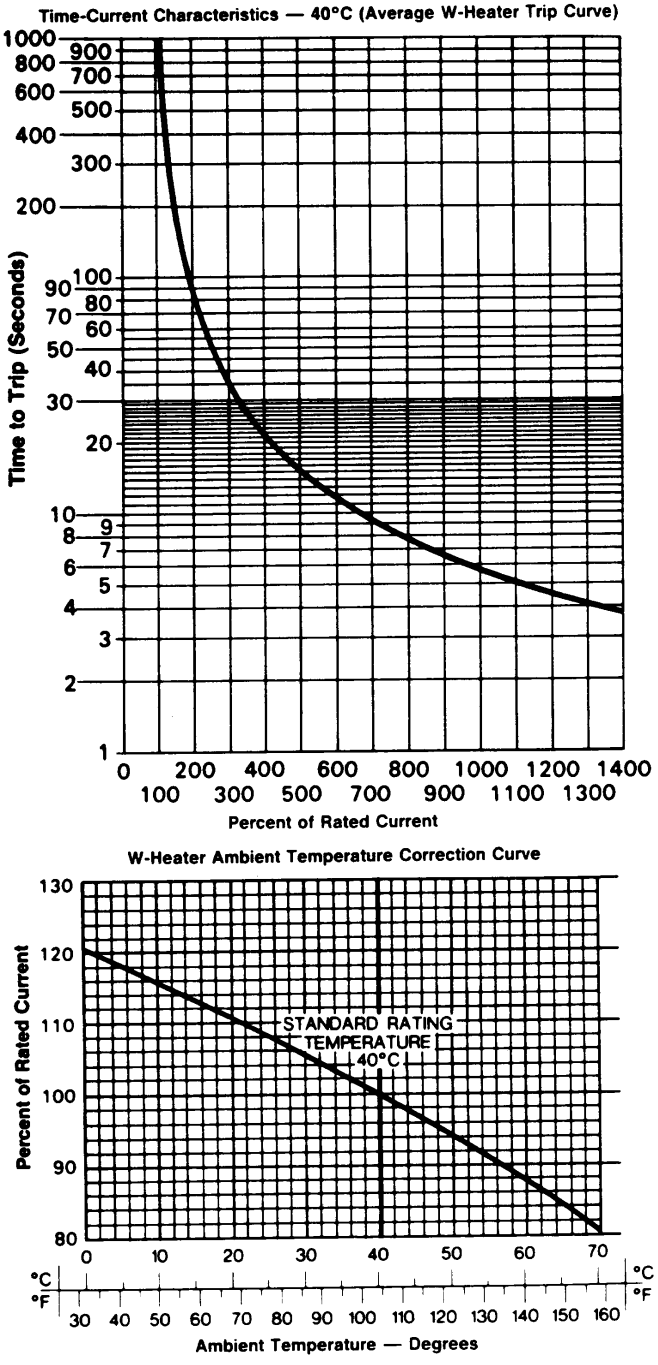
Select the heater element number one rating smaller than determined by the rules in paragraphs 1, 2, and 3. This provides protection at current levels 10% lower than indicated above.

(1) Rules 2 and 3 apply when the temperature difference does not exceed 10°C (18°F). Consult your local Allen-Bradley distributor or Rockwell Automation sales representative when the temperature difference is greater.

Motors Rated For Intermittent Duty

Consult your local Allen-Bradley distributor or Rockwell Automation sales representative.

Class 20 Curve



Heater Element Selection Tables

Table 303 - Index to Heater Element Selection Tables

Device	Bulletin Number	Size	Table Number
Combination Motor Starters	2106/2107	NEMA 1…4	Table 305 - NEMA Table 143
		NEMA 5	Table 311 - NEMA Table 347
	2112/2113 (0.5 space factor)	NEMA 1	Table 308 - NEMA Table 181
	2112/2113 (1)	NEMA 1…4	Table 305 - NEMA Table 143
		NEMA 5	Table 311 - NEMA Table 347
		NEMA 6	Table 309 - NEMA Table 195
	2112/2113	Vacuum contactor starters	Table 309 - NEMA Table 195
	2113 (1)	NEMA 3, 4	Table 307 - NEMA Table 152
	2113 Dual	NEMA 1	Table 304 - NEMA Table 141
		NEMA 2	Table 306 - NEMA Table 146
	2122/2123	NEMA 1…4	Table 305 - NEMA Table 143
		NEMA 5	Table 311 - NEMA Table 347

(1) For Bulletin 2113 NEMA size 3 in 1.5 space factor units and NEMA size 4 in 2.0 space factor units, use Table 152.

Table 304 - NEMA Table 141

Heater Element Number	Full-load Amps Size 1	Heater Element Number	Full-load Amps Size 1	Heater Element Number	Full-load Amps Size 1	Heater Element Number	Full-load Amps Size 1
W10	0.18	W38	2.73	W24	0.72	W52	10.2
W11	0.20	W39	3.00	W25	0.79	W53	11.2
W12	0.22	W40	3.30	W26	0.87	W54	12.3
W13	0.24	W41	3.63	W27	0.96	W55	13.3
W14	0.27	W42	4.00	W28	1.05	W56	14.8
W15	0.30	W43	4.40	W29	1.16	W57	16.1
W16	0.33	W44	4.84	W30	1.27	W58	17.5
W17	0.36	W45	5.32	W31	1.40	W59	19.0
W18	0.40	W46	5.84	W32	1.54	W60	20.7
W19	0.44	W47	6.41	W33	1.70	W61	22.5
W20	0.48	W48	7.03	W34	1.87	W62	24.5
W21	0.53	W49	7.72	W35	2.05	W63	26.6
W22	0.59	W50	8.47	W36	2.26	W64	28.8
W23	0.65	W51	9.3	W37	2.48	—	—

Table 305 - NEMA Table 143

Heater Element Number	Full-load Amps			
	Size 1	Size 2	Size 3	Size 4
W10	0.19	—	—	—
W11	0.21	—	—	—
W12	0.23	—	—	—
W13	0.25	—	—	—
W14	0.28	—	—	—
W15	0.30	—	—	—
W16	0.33	—	—	—
W17	0.36	—	—	—
W18	0.40	—	—	—
W19	0.44	—	—	—
W20	0.49	—	—	—
W21	0.53	—	—	—
W22	0.58	—	—	—
W23	0.64	—	—	—
W24	0.70	—	—	—
W25	0.77	—	—	—
W26	0.85	—	—	—
W27	0.93	—	—	—
W28	1.02	—	—	—
W29	1.12	—	—	—
W30	1.23	—	—	—
W31	1.35	—	—	—
W32	1.48	—	—	—
W33	1.62	—	—	—
W34	1.79	—	—	—
W35	1.97	—	—	—
W36	2.18	—	—	—
W37	2.40	—	—	—
W38	2.65	—	—	—
W39	2.92	—	—	—
W40	3.23	—	—	—
W41	3.56	—	—	—
W42	3.93	—	—	—
W43	4.30	—	—	—
W44	4.71	—	—	—
W45	5.16	—	—	—
W46	5.66	—	—	—

Heater Element Number	Full-load Amps			
	Size 1	Size 2	Size 3	Size 4
W47	6.28	—	—	—
W48	6.94	—	—	—
W49	7.71	—	—	—
W50	8.45	8.56	—	—
W51	9.29	9.4	—	—
W52	10.3	10.4	—	—
W53	11.4	11.5	—	—
W54	12.5	12.6	—	—
W55	13.7	13.8	—	—
W56	15.0	15.1	—	—
W57	16.3	16.4	—	—
W58	17.7	17.9	—	—
W59	19.3	19.5	—	—
W60	20.9	21.2	—	—
W61	22.7	23.0	25.4	—
W62	24.7	25.1	27.8	—
W63	26.9	27.3	30.5	—
W64	29.2	29.7	33.5	35.0
W65	—	31.5	37.0	38.5
W66	—	34.5	40.5	42.0
W67	—	37.5	44.5	46.0
W68	—	41.0	48.5	51.0
W69	—	44.0	53.0	56.0
W70	—	47.0	59.0	61.0
W71	—	—	64.0	66.0
W72	—	—	69.0	71.0
W73	—	—	73.0	76.0
W74	—	—	77.0	82.0
W75	—	—	81.0	88.0
W76	—	—	85.0	94.0
W77	—	—	90.0	100.0
W78	—	—	—	106.0
W79	—	—	—	113.0
W80	—	—	—	120.0
W81	—	—	—	128.0
W82	—	—	—	135.0

Table 306 - NEMA Table 146

Heater Element Number	Full-load Amps	Heater Element Number	Full-load Amps
	Size 2		Size 2
W45	5.53	W58	17.3
W46	6.04	W59	18.9
W47	6.60	W60	20.6
W48	7.21	W61	22.5
W49	7.87	W62	24.6
W50	8.60	W63	26.8
W51	9.39	W64	29.4
W52	10.3	W65	32.0
W53	11.2	W66	34.5
W54	12.2	W67	37.5
W55	13.3	W68	41.0
W56	14.6	W69	44.5
W57	15.8	—	—

Table 307 - NEMA Table 152

Heater Element Number	Full-load Amps		
	Size 2	Size 3	Size 4
W45	—	—	—
W46	—	—	—
W47	—	—	—
W48	—	—	—
W49	—	—	—
W50	8.56	—	—
W51	9.4	—	—
W52	10.4	—	—
W53	11.5	—	—
W54	12.6	—	—
W55	13.8	—	—
W56	15.1	—	—
W57	16.4	—	—
W58	17.7	—	—
W59	19.1	—	—
W60	21.1	—	—
W61	23.2	25.1	—
W62	25.7	27.5	—
W63	28.5	30.5	33.0
W64	30.5	33.5	36.0

Heater Element Number	Full-load Amps		
	Size 2	Size 3	Size 4
W65	33.0	36.5	39.5
W66	35.5	40.0	43.0
W67	38.5	44.0	47.0
W68	41.5	48.0	51.0
W69	45.0	53.0	56.0
W70	—	58.0	61.0
W71	—	62.0	66.0
W72	—	67.0	72.0
W73	—	72.0	77.0
W74	—	77.0	83.0
W75	—	82.0	89.0
W76	—	88.0	95.0
W77	—	94.0	102.0
W78	—	—	108.0
W79	—	—	116.0
W80	—	—	123.0
W81	—	—	130.0
W82	—	—	137.0

Table 308 - NEMA Table 181

Heater Element Number	Full-load Amps
	2112/2113 Size 1 0.5 Space Factor
W23	0.67
W24	0.74
W25	0.84
W26	0.90
W27	1.00
W28	1.10
W29	1.22
W30	1.31
W31	1.43
W32	1.55
W33	1.66
W34	1.80
W35	1.97
W36	2.12
W37	2.33
W38	2.59
W39	2.84
W40	3.15
W41	3.46
W42	3.84
W43	4.27
W44	4.73
W45	5.36
W46	5.82
W47	6.33
W48	6.97
W49	7.63
W50	8.49
W51	9.24
W52	10.1
W53	11.1
W54	12.2
W55	13.6
W56	14.6
W57	15.7
W58	17.2
W59	18.9

Heater Element Number	Full-load Amps
	2112/2113 Size 1 0.5 Space Factor
W60	20.5
W61	22.2
W62	24.2
W66	—
W67	—
W68	—
W69	—
W70	—
W71	—
W72	—
W73	—
W74	—
W75	—
W76	—
W77	—
W78	—
W79	—
W80	—
W81	—
W82	—
W83	—
W84	—
W85	—

Table 309 - NEMA Table 195

Heater Element Number	Full-load Amps
	2112/2113 Size 6
W26	115
W27	125
W28	135
W29	147
W30	165
W31	179
W32	196
W33	216
W34	232
W35	260
W36	287
W37	315
W38	350
W39	385
W40	420
W41	465
W42	515

Table 310 -

Heater Element Number	Full-load Amps			
	200 A	400 A Plug-in Unit with 300:5 CT Ratio(2)	400 A Frame Mounted Unit with 400:5 CT Ratio(2)	600 A
W31	59(1)	—	—	—
W32	65(1)	—	—	—
W33	70	—	—	—
W34	75	—	150	—
W35	81	—	160	—
W36	89	—	175	287
W37	98	150	195	315
W38	110	160	215	350
W39	120	175	235	385
W40	132	195	260	420
W41	143	215	293	465
W42	155	235	320	—
W43	170	250	350	—
W44	193	293	380	—

(1) Exceeds 20 seconds at six times rating, providing Class 30 protection.

(2) 400 A Vacuum Contactors Starters use 300:5 CT Ratio except 125 HP at 208V, 125…150 HP at 240V, 250 HP at 380…415V, 250…300 HP at 480V, and 350…400 HP at 600V use 400:5 CT Ratio.

Table 311 - NEMA Table 347

Heater Element Number	Full-load Amps
	Size 5
W29	77
W30	83
W31	90
W32	98
W33	107
W34	116
W35	126
W36	138
W37	150
W38	164
W39	178
W40	194
W41	212
W42	232
W43	254
W44	270
W45	—

Full-load Currents

The full-load currents listed below are average values for horsepower rated motors of several manufacturers at the more common rated voltages and speeds. These average values, along with the similar values listed in the NEC/UL/C-UL, should be used only as a guide for selecting suitable components for the motor branch circuit. The rated full load current, shown on the motor nameplate, can vary considerably from the listed value, depending on the specific motor design.

IMPORTANT Use the motor nameplate full-load current to determine the rating of the devices used for motor running overcurrent protection.

Table 312 -

HP	RPM	Full-load Current			
		208V	240V	480V	600V
0.25	3600	1.20	1.04	0.52	0.42
	1800	1.39	1.20	0.60	0.48
	1200	1.62	1.40	0.70	0.56
0.33	3600	1.48	1.28	0.64	0.51
	1800	1.69	1.46	0.73	0.58
	1200	1.89	1.64	0.82	0.66
0.50	3600	2.08	1.80	0.90	0.72
	1800	2.54	2.20	1.10	0.88
	1200	2.89	2.50	1.25	1.00
0.75	3600	2.89	2.50	1.25	1.00
	1800	3.47	3.00	1.50	1.20
	1200	3.81	3.30	1.65	1.32
1	3600	3.51	3.04	1.52	1.22
	1800	4.25	3.68	1.84	1.47
	1200	4.60	3.98	1.99	1.59
1.5	3600	5.04	4.36	2.18	1.74
	1800	5.80	5.02	2.51	2.01
	1200	6.49	5.62	2.81	2.25
2	3600	6.51	5.64	2.82	2.26
	1800	7.18	6.22	3.11	2.49
	1200	8.20	7.10	3.55	2.84
3	3600	9.24	8.00	4.00	3.20
	1800	10.4	9.04	4.52	3.62
	1200	11.6	10.1	5.04	4.03
5	3600	15.7	13.6	6.80	5.44
	1800	15.9	13.8	6.88	5.50
	1200	18.6	16.1	8.07	6.46
7.5	3600	22.1	19.1	9.57	7.66
	1800	25.0	21.7	10.8	8.66
	1200	26.6	23.1	11.5	9.22
10	3600	29.7	25.7	12.9	10.3
	1800	31.5	27.3	13.7	10.9
	1200	32.9	28.4	14.2	11.4
15	3600	43.0	37.2	18.6	14.9
	1800	46.7	40.4	20.2	16.2
	1200	49.1	42.5	21.3	17.0
20	3600	59.2	51.3	25.6	20.5
	1800	59.6	51.6	25.8	20.6
	1200	61.7	53.4	26.7	21.4
25	3600	70.9	61.4	30.7	24.6
	1800	74.7	64.7	32.3	25.9
	1200	76.0	65.8	32.9	26.3
30	3600	85.7	74.2	37.1	29.7
	1800	88.2	76.4	38.2	30.5
	1200	91.6	79.3	39.7	31.7
40	3600	111	96.0	48.0	38.4
	1800	117	102	50.8	40.6
	1200	119	103	51.7	41.4
50	3600	141	122	61.2	49.0
	1800	144	125	62.3	49.8
	1200	147	127	63.4	50.7
60	3600	165	143	71.6	57.3
	1800	172	149	74.3	59.4
	1200	173	150	74.9	59.9
75	3600	204	177	88.5	70.8
	1800	211	183	91.4	73.1
	1200	215	186	93.1	74.5
100	3600	267	231	116	92.6
	1800	276	239	119	95.5
	1200	281	243	122	97.2
125	3600	333	288	144	115
	1800	340	294	147	118
	1200	347	300	150	120
150	3600	397	344	172	138
	1800	404	350	175	140
	1200	414	358	179	143
200	3600	524	454	227	182
	1800	531	460	230	184
	1200	538	466	233	186
250	3600	642	556	278	222
	1800	658	570	285	228
	1200	682	590	295	236
300	3600	774	670	335	268
	1800	790	684	342	274
	1200	804	696	348	278
350	3600	—	748	374	299
	1800	—	762	381	305
	1200	—	774	387	310
400	3600	—	874	437	350
	1800	—	892	446	357
	1200	—	902	451	361
450	3600	—	972	486	389
	1800	—	992	496	397
	1200	—	1004	502	402
500	3600	—	1074	537	430
	1800	—	1096	548	438
	1200	—	1108	554	443

Full-load Currents

The full-load currents listed below are average values for kW rated motors of several manufacturers at the more common rated voltages and speeds. These average values should be used only as a guide for selecting suitable components for the motor branch circuit. The rated full load current, shown on the motor nameplate, can vary considerably from the listed value, depending on the specific motor design.

IMPORTANT Use the motor nameplate full-load current to determine the rating of the devices used for motor running overcurrent protection.

Table 313 -

kW	Full-load Current (Amperes) Average Values for 4-Pole (1500 rpm) Motors				
	220V	230V (1)	380V	400V (1)	415V
0.25	1.40	1.34	0.88	0.83	0.80
0.37	2.10	2.00	1.20	1.18	1.16
0.55	2.75	2.60	1.50	1.47	1.45
0.75	3.50	3.30	2.10	2.00	1.90
1.1	4.40	4.20	2.60	2.50	2.40
1.5	6.00	5.70	3.50	3.30	3.20
2.2	8.70	8.30	5.00	4.80	4.60
3.7	14	13.4	8.20	7.80	7.50
5.5	20	19.1	11.5	10.9	10.5
7.5	27	25.8	15.5	14.8	14.2
11	39	37.3	22	21.1	20.5
15	52	50	30	29	28
18.5	64	61	37	36	35
22	75	72	44	42	40
30	103	99	60	57	55
37	126	121	72.5	69	66
45	147	141	85	82	80
55	182	174	105	100	96
75	239	229	138	136	135
90	295	282	170	167	165
110	356	341	205	202	200
132	425	407	245	236	230
150	484	463	280	269	260
160	520	497	300	286	275
185	580	555	340	324	312
200	640	612	370	353	340
220	710	679	408	395	385
250	—	—	475	461	450

(1) These values are calculated.

Inverse Time Thermal Magnetic Trip or Electronic Trip Circuit Breaker Interrupting Capacity Ratings

Table 314 -

Circuit Breaker Code	Frame	Circuit Breaker Suffix	Breaker Trip Type	Interrupting Capacity Ratings (rms symmetrical Amperes)		
				208V, 230V, 240V	380…415V, 480V	600V[1]
G6C3	G-Frame (125 A)	TGM	Inverse Time (Thermal Magnetic)	100 kA	65 kA	—
H6C3	H-Frame (125 A) up to 70 A	THM	Inverse Time (Thermal Magnetic)	100 kA	65 kA	—
H6F3	H-Frame (125 A) above 70 A	THM	Inverse Time (Thermal Magnetic)	100 kA	65 kA	—
H6H3	H-Frame (125 A)	THML	Inverse Time (Electronic)	100 kA	65 kA	—
H0C3	H-Frame (125 A) up to 70 A	THX	Inverse Time (Thermal Magnetic)	—	100 kA	—
H0F3	H-Frame (125 A) above 70 A	THX	Inverse Time (Thermal Magnetic)	—	100 kA	35 kA
H0H3	H-Frame (125 A)	THXL	Inverse Time (Electronic)	—	100 kA	35 kA
H15H3	H-Frame (125 A)	THUL	Inverse Time (Electronic)	—	—	42 kA
J6F3	J-Frame (250 A)	TJM	Inverse Time (Thermal Magnetic)	100 kA	65 kA	—
J15C3	J-Frame (160 A) up to 70 A	TJU	Inverse Time (Thermal Magnetic)	—	—	100 kA
J15F3	J-Frame (160 A) above 70 A	TJU	Inverse Time (Thermal Magnetic)	—	—	100 kA
J0F3	J-Frame (250 A)	TJX	Inverse Time (Thermal Magnetic)	—	100 kA	35 kA
K6H3	K-Frame (400 A)	TKM	Inverse Time (Electronic)	100 kA	65 kA	—
K15H3	K-Frame (400 A)	TKU	Inverse Time (Electronic)	—	—	100 kA
K0H3	K-Frame (400 A)	TKX	Inverse Time (Electronic)	—	100 kA	65 kA
K15H3	K-Frame (400 A)	TKU	Inverse Time (Electronic)	—	—	100 kA
M6H3	M-Frame (800 A)	TMM	Inverse Time (Electronic)	100 kA	65 kA	—
M0H3	M-Frame (800 A)	TMX	Inverse Time (Electronic)	—	100 kA	42 kA

Table 314 -

Circuit Breaker Code	Frame	Circuit Breaker Suffix	Breaker Trip Type	Interrupting Capacity Ratings (rms symmetrical Amperes)		
				208V, 230V, 240V	380…415V, 480V	600V[1]
N6H3	N-Frame (1200 A)	TNM	Inverse Time (Electronic)	100 kA	65 kA	—
N0H3	N-Frame (1200 A)	TNX	Inverse Time (Electronic)	—	100 kA	65 kA
R15I3	R-Frame (3000 A)	TRUG	Inverse Time (Electronic)	100 kA	100 kA	100 kA

(1) For Bulletin 2107, 2113, and 2123 interrupting capacity is 65 kA at 600 V.

3-Pole Inverse Time Circuit Breaker Characteristics for Bulletin 2193F and 2193M Units

Table 315 -

Rating (Amperes)	CB Frame	Thermal Mag Trip Unit		Electronic Trip Units (with interchangeable rating plugs)(2)	
		Interchangeable	Non-interchangeable	LSI	LSIG
125	G	--------	STD	--------	--------
125	H	STD 50…125 A	STD up to 40 A	Optional 25 A, 60 A, 100 A, 125 A	Optional 25 A, 60 A, 100 A, 125 A(3)
250	J	STD 80…250 A	STD up to 70 A	Optional 40 A, 60 A, 100 A, 150 A, 250 A	Optional 40 A, 60 A, 100 A, 150 A, 250 A(3)
400	K	STD	--------	STD	Optional(3)
800(1)	M	STD	--------	STD	Optional
1200	N	STD	--------	STD	Optional
3000	R	STD	--------	--------	STD

(1) Sealed to be suitable for reverse-fed applications. Trip units are not interchangeable. Rating plugs are interchangeable.
Trip units are provided with test points for functional field testing with a portable electronic test set. These trip units incorporate a powered thermal memory that recalls near trip conditions and automatically imposes a shorter time delay, thereby preventing system damage from cumulative overheating. These units also incorporate an unpowered thermal memory feature that remembers a trip has occurred and will protect against repeated overload conditions if the CB is re-closed before a sufficient cool down period has elapsed.

(2) Definitions are as follows:
- LSI: optional trip unit that provides additional flat response short time delay adjustments with an instantaneous setting.
- LSIG: optional LSI unit with ground fault protection and adjustable pickup current and time delay.

(3) This unit is engineered.

UL/C-UL/CSA Short Circuit Ratings for Combination Fusible Disconnect Units

Table 316 -

Fuse Class	Device/Bulletin	Size/Rating	Short Circuit Withstand Ratings (Amperes rms Symmetrical)
			UL/C-UL/CSA (except where noted) 600V or less
CC	2102L	30 A	100 kA
	2106, 2112, 2122, 2126	#1	100 kA
	2106, 2112 Space Saving NEMA	#1	100 kA
H	2102L	30…100 A	5 kA
	2102L	200…300 A	10 kA
	2106, 2112, 2122, 2126	#1…3	5 kA
	2106, 2112, 2122	#4…5	10 kA
	2112	#6	10 kA
	2112 Vacuum Contactor Starters	200 A, 400 A, 600 A	10 kA
	2196		10 kA
J, R	2102L	30…100 A	100 kA
	2102L	200…300 A	100 kA
	2106, 2112, 2122, 2126	#1…3	100 kA
	2106, 2112, 2122	#4…5	100 kA
	2106, 2112 Space Saving NEMA	#1	100 kA
	2112	#6	100 kA
	2112 Vacuum Contactor Starters	200 A, 400 A, 600 A	100 kA
	2196		100 kA
HRCII-C	2106, 2112, 2122, 2126	#1…3	100 kA (1)
	2106, 2112, 2122	#4…5	100 kA (1)
	2106, 2112 Space Saving NEMA	#1	100 kA (1)
	2112	#6	100 kA (1)
	2112 Vacuum Contactor Starters	200 A, 400 A, 600 A	100 kA
L	2112	#6	100 kA

(1) NOT UL listed.

UL/C-UL/CSA Short Circuit Ratings for Combination Soft Starter Units (SMCs)

Table 317 - Combination Fusible Disconnect Soft Starter Units for Bulletin 2154H and 2154J

Bulletin Number	SMC Device Rating	Fuse Class	Short Circuit Withstand Ratings (Amperes rms Symmetrical)		
			240V	480V	600V
2154H	3…85 A	J	100 kA	100 kA	100 kA
	108 A and 135 A		65 kA	65 kA	65 kA
2154J	5…85 A		100 kA	100 kA	100 kA
	108 A and 135 A		65 kA	65 kA	65 kA
	201…361A		100 kA	100 kA	100 kA
	480 A	L	100 kA	100 kA	100 kA

Table 318 - Combination Circuit Breaker Soft Starter Units for Bulletin 2155H and 2155J

Bulletin Number	SMC Device Rating	FRAME	SCCR		
			208V, 230V, 240V	380…415V 480V	600V
2155H w/ Required 13HIC	3…43 A	G6C (TGM) H6C (THM)	100 kA	100 kA	N/A
		H0C (THX)	100 kA	100 kA	100 kA
	60 A and 85 A	G6C (TGM) H6F (THM)	100 kA	100 kA	N/A
		H0F (THX)	100 kA	100 kA	100 kA
	108 A and 135 A	J6F (TJM)	100 kA	100 kA	N/A
		J0F (TJX)	100 kA	100 kA	100 kA
2155J w/ Required 13HIC	5…85 A	G6C (TGM) H6C (THM)	100 kA	100 kA	N/A
		H0C (THX)	100 kA	100 kA	25 kA
	108…135 A	J6F (TJM)	100 kA	100 kA	N/A
		J0F (TJX)	100 kA	100 kA	100 kA
	201 A	J6F (TJM)	100 kA	100 kA	N/A
		J0F (TJX)	100 kA	100 kA	100 kA
	251 A	K6H (TKM)	100 kA	100 kA	N/A
		K0H (TKX)	100 kA	100 kA	100 kA
	317…480 A	M6H (TMM)	100 kA	100 kA	N/A
		M0H (TMX)	100 kA	100 kA	100 kA

UL/C-UL/CSA Short Circuit Ratings for Combination Variable Frequency AC Motor Drive Units

Table 319 - AC Drive Combination Fusible Disconnect Units for Bulletins 2162Q, 2162R, 2162T, 2162U, 2162V, 2162W, and 2162X

Fuse Class	Bulletin Number	Horsepower	Short Circuit Withstand Rating (amperes rms symmetrical)	
			480V	600V
CC, J	2162T	All ratings	100 kA	100 kA
CC, J	2162W, 2162X	All ratings	100 kA	100 kA
J	2162Q, 2162R	All ratings	100 kA	100 kA
J	2162U, 2162V	All ratings	100 kA	N/A

Table 320 - AC Drive Combination Circuit Breaker Units for Bulletins 2163Q, 2163R, 2163T, 2163U, 2163V, 2163W, and 2163X

Bulletin Number	Frame (catalog code suffix)	With Drive Input Fuse Class	Without Drive Input Fuse Class	Horsepower	Short Circuit Withstand Ratings (amperes rms symmetrical)	
					480V	600V
2163T	T_M	CC, J	N/A	All Ratings	100 kA	100 kA
2163Q	T_M	J	N/A	All Ratings	100 kA	100 kA
2163R	T_M	J	N/A	All Ratings	100 kA	100 kA
2163U, V	T_M, T_X	J	---	All Ratings	100 kA	N/A
2163U, V	T_M	---	Yes	All Ratings	65 kA	N/A
2163U, V	T_X	---	Yes	All Ratings	100 kA	N/A
2163W, X	T_M	CC	N/A	0.5…10 HP	100 kA	100 kA
2163W, X	T_M	J	N/A	15…20 HP	100 kA	100 kA
2163W, X	T_X	CC	N/A	15…20 HP	100 kA	100 kA
2163W, X	T_X	J	N/A	0.5…10 HP	100 kA	100 kA

UL/C-UL/CSA Short Circuit Ratings for Programmable Controllers

The following tables show short circuit capabilities for combination units that are UL listed and CSA certified.

Table 321 -

Fuse Class	Bulletin Number	Short Circuit Withstand Ratings (Amperes rms Symmetrical)			
		240V	380…415V	480V	600V
CC	2182L	100 kA	100 kA	100 kA	100 kA

Table 322 -

Circuit Breaker Frame	Bulletin Number	Short Circuit Withstand Ratings (amperes rms symmetrical)		
		240V	380…480V	600V
G6C3 (TGM)	2183L	100 kA	65 kA	---
H0C3 (THX)	2183L	---	100 kA	35 kA
J15C3 (TJU)	2183L	---	---	100 kA

kW to Catalog HP Code Conversion for Bulletins 2106, 2107, 2112, 2113, 2122, and 2123

Table 323 -

kW (1)	Metric HP	Required NEMA HP Rating	Required Catalog HP Code
0.06	0.08	0.125	30
0.09	0.12	0.125	30
0.12	0.16	0.25	31
0.18	0.24	0.25	31
0.25	0.34	0.33	32
0.37	0.5	0.5	33
0.55	0.75	0.75	34
0.75	1	1	35
1.1	1.5	1.5	36
1.5	2	2	37
1.8	2.4	3	38
2.2	3	3	38
3	4	5	39
3.7	5	5	39
4	5.5	7.5	40
5.5	7.5	7.5	40
6.3	8.5	10	41
7.5	10	10	41
10	13.5	15	42
11	15	15	42
13	18	20	43
15	20	20	43
17	23	25	44
18.5	25	25	44
20	27	30	45

kW (1)	Metric HP	Required NEMA HP Rating	Required Catalog HP Code
22	30	30	45
25	34	40	46
30	40	40	46
32	43	50	47
37	50	50	47
40	54	60	48
45	60	60	48
50	68	75	49
55	75	75	49
63	85	100	50
75	100	100	50
80	110	125	51
90	125	125	51
100	136	150	52
110	150	150	52
125	169	200	54
132	180	200	54
150	205	250	56
160	220	250	56
185	250	250	56
200	270	300	57
220	300	300	57
250	340	350	58
315	430	400	59

(1) For ratings other than those listed, use the next highest rating shown.

Recommended Capacitor Sizes 480V and 600V

Table 324 lists suggested capacitor ratings for T-frame NEMA Design B induction motors when the capacitor and motor are switched as a unit. It is based on normal starting current and torque.

Table 325 lists suggested capacitor ratings for U-frame NEMA Design B induction motors when the capacitor and motor are switched as a unit. It is based on normal starting current and torque.

Table 324 -

Horsepower	3600 RPM	1800 RPM	1200 RPM	900 RPM
5	2 kVAR	2.5 kVAR	3 kVAR	4 kVAR
7.5	2.5 kVAR	3 kVAR	4 kVAR	5 kVAR
10	4 kVAR	4 kVAR	5 kVAR	6 kVAR
15	5 kVAR	5 kVAR	6 kVAR	7.5 kVAR
20	6 kVAR	6 kVAR	7.5 kVAR	9 kVAR
25	7.5 kVAR	7.5 kVAR	8 kVAR	10 kVAR
30	8 kVAR	8 kVAR	10 kVAR	15 kVAR
40	12.5 kVAR	15 kVAR	15 kVAR	17.5 kVAR
50	15 kVAR	17.5 kVAR	20 kVAR	22.5 kVAR
60	17.5 kVAR	20 kVAR	22.5 kVAR	25 kVAR
75	20 kVAR	25 kVAR	25 kVAR	30 kVAR
100	22.5 kVAR	30 kVAR	30 kVAR	35 kVAR
125	25 kVAR	35 kVAR	35 kVAR	40 kVAR
150	30 kVAR	40 kVAR	40 kVAR	50 kVAR
200	35 kVAR	50 kVAR	50 kVAR	70 kVAR
250	40 kVAR	60 kVAR	60 kVAR	80 kVAR
300	45 kVAR	70 kVAR	75 kVAR	100 kVAR
350	50 kVAR	75 kVAR	90 kVAR	120 kVAR
400	75 kVAR	80 kVAR	100 kVAR	130 kVAR
450	80 kVAR	90 kVAR	120 kVAR	140 kVAR
500	100 kVAR	120 kVAR	150 kVAR	160 kVAR

Table 325 -

Horsepower	3600 RPM	1800 RPM	1200 RPM	900 RPM
5	2 kVAR	2 kVAR	2 kVAR	3 kVAR
7.5	2.5 kVAR	2.5 kVAR	3 kVAR	4 kVAR
10	3 kVAR	3 kVAR	3 kVAR	5 kVAR
15	4 kVAR	4 kVAR	5 kVAR	6 kVAR
20	5 kVAR	5 kVAR	6 kVAR	7.5 kVAR
25	6 kVAR	6 kVAR	7.5 kVAR	9 kVAR
30	7 kVAR	7 kVAR	9 kVAR	10 kVAR
40	9 kVAR	9 kVAR	10 kVAR	12.5 kVAR
50	12.5 kVAR	10 kVAR	12.5 kVAR	15 kVAR
60	15 kVAR	15 kVAR	15 kVAR	17.5 kVAR
75	17.5 kVAR	17.5 kVAR	17.5 kVAR	20 kVAR
100	22.5 kVAR	20 kVAR	25 kVAR	27.5 kVAR
125	27.5 kVAR	25 kVAR	30 kVAR	30 kVAR
150	30 kVAR	30 kVAR	35 kVAR	37.5 kVAR
200	40 kVAR	37.5 kVAR	40 kVAR	50 kVAR
250	50 kVAR	45 kVAR	50 kVAR	60 kVAR
300	60 kVAR	50 kVAR	60 kVAR	60 kVAR
350	60 kVAR	60 kVAR	75 kVAR	75 kVAR
400	75 kVAR	60 kVAR	75 kVAR	85 kVAR
450	75 kVAR	75 kVAR	80 kVAR	90 kVAR
500	75 kVAR	75 kVAR	85 kVAR	100 kVAR

Horsepower Ratings for Bulletin 2192F, Fusible Disconnect Feeder Switch (FDS) Units

Table 326 -

Switch Ratings (Amperes)	Horsepower at Rated Motor Voltage				
	200V	230V	380-415V	460V	575V
30	0.125…7.5	0.125…7.5	0.125…15	0.125…15	0.125…20
60	10…15	10…15	20…30	20…30	25…40
100	20…25	20…30	40…50	40…50	50
200	30…50	40…60	60…100	60…125	60…150
400	60…100	75…125	125…250	150…250	175…350
600	125…150	150…200	300…350	300…400	400

Conductor Size Conversion Chart— Metric Conductor Size to American Wire Gauge Conductor Size

Table 327 -

Metric Conductor Size	American Wire Gauge Size (1) (actual size in mm^2)
1.0 mm^2	#18 (0.823)
1.5 mm^2	#16 (1.31)
2.5 mm^2	#14 (2.68)
4 mm^2	#12 (3.31)
6 mm^2	#10 (5.26)
10 mm^2	#8 (8.37)
16 mm^2	#6 (13.30)
25 mm^2	#4 (21.13)
25 mm^2	#3 (2) (26.67)
35 mm^2	#2 (33.62)
35 mm^2	#1 (2) (44.21)
50 mm^2	#1/0 (53.49)
70 mm^2	#2/0 (67.43)
95 mm^2	#3/0 (85.01)
95 mm^2	#4/0 (2) (107.20)
120 mm^2	250 kcmil (127.0)
150 mm^2	300 kcmil (152.0)
185 mm^2	350 kcmil (177.0)
185 mm^2	400 kcmil (2) (203.0)
240 mm^2	500 kcmil (253.0)
300 mm^2	600 kcmil (304.0)
400 mm^2	750 kcmil (350.0)

(1) Reference IEC Standard 60947-1, table I.

(2) This American wire gauge conductor size is the closest equivalent to the metric conductor size.

Metric Conversion Table

Table 328 -

English Measurement (inches)	Metric Equivalent (millimeter)	English Measurement (inches)	Metric Equivalent (millimeter)	English Measurement (inches)	Metric Equivalent (millimeter)	English Measurement (inches)	Metric Equivalent (millimeter)
0.016	0.40	0.313	7.94	1	25.40	20	508.00
0.031	0.79	0.375	9.53	2	50.80	30	762.00
0.063	1.59	0.438	11.11	3	76.20	40	1016.00
0.094	2.38	0.500	12.70	4	101.60	50	1270.00
0.125	3.18	0.563	14.29	5	127.00	60	1524.00
0.156	3.97	0.625	15.88	6	152.40	70	1778.00
0.188	4.76	0.688	17.46	7	177.80	80	2032.00
0.218	5.56	0.750	19.05	8	203.20	90	2286.00
0.250	6.35	0.875	22.23	9	228.60	100	2540.00
0.281	7.14	0.938	23.81	10	254.00	200	5080.00

1 inch = 2.54 centimeters
1 foot = 12 inches
1 centimeter = 10 millimeters

Fans and Ventilation in Bulletins 2154H, 2154J, 2155H and 2155J

Table 329 -

Bulletin	System Voltage	NEMA Enclosure Type	Rating Code	Venting	Door Mounted Exhaust Fans
Bulletins 2154H and 2155H	All	1, 1G	A, B, D, E, F, G (3…37 Ampere)	No	No
	All	1, 1G	H, J, K, L, M (43…135 Ampere)	Yes	Yes
	All	12	A, B, D, E, F, G, H, J, K (3…85 Ampere)	No	No
	All	12	L, M (108… 135 Ampere)	Yes	Yes (filtered and gasketed)
Bulletins 2154J and 2155J	All	1, 1G	F005 to F135 (5…135 Ampere)	Yes	Yes
	All	1, 1G	F201 to F480 (201…480 Ampere)	No	No
	All	12	F005 to F135 (5…135 Ampere)	Yes	Yes (filtered and gasketed)
	All	12	F201 to F480 (201…480 Ampere)	No	No

Fans and Ventilation in Bulletins 2162Q, 2162R, 2163Q, 2163R, 2162U, 2163U, 2162V, and 2163V

Table 330 -

Bulletin	System Voltage	NEMA Enclosure Type	Rating Code	Venting	Internal Circulating Fans	Door Mounted Exhaust Fans
2162Q and 2163Q	380…415V	1, 1G	1P3 - 5P0	Yes	None	Yes
			8P7 - 072	Yes	None	Yes
		12	1P3 - 022	None	Yes	None
			030	Yes (filtered and gasketed)	None	Yes (filtered and gasketed)
			037 - 072	Yes (filtered and gasketed)	Yes	Yes (filtered and gasketed)
	480V	1, 1G	1P1 - 3P4	Yes	None	None
			5P0	Yes	None	Yes (1)
			8P0 - 065	Yes	None	Yes
		12	1P1 - 2P1	None	None	None
			3P4 - 022	None	Yes	None
			027	Yes (filtered and gasketed)	None	Yes (filtered and gasketed)
			034 - 065	Yes (filtered and gasketed)	Yes	Yes (filtered and gasketed)
	600V	1, 1G	0P9 - 2P7	Yes	None	None
			3P9 - 052	Yes	None	Yes (1)
		12	0P9 - 1P7	None	None	None
			2P7 - 017	None	Yes	None
			022 - 052	Yes (filtered and gasketed)	None	Yes (filtered and gasketed)
2162R and 2163R	380…415V	1, 1G	1P3 - 5P0	Yes	None	None
			8P7 - 030	Yes	None	Yes
			037 - 056	Yes	None	Yes
			072 - 300	Yes	None	Yes
		12	1P3 - 043	None	Yes	None
			056 - 072	Yes (filtered and gasketed)	Yes	Yes (filtered and gasketed)
			105 - 170	Yes (filtered and gasketed)	None	Yes (filtered and gasketed)
	480V	1, 1G	1P1 - 5P0	Yes	None	None
			8P0 - 300	Yes	None	Yes
		12	1P1 - 034	None	Yes	None
			040 (without reactor)	None	Yes	None
			040 (with reactor)	Yes (filtered and gasketed)	Yes	Yes (filtered and gasketed)
			052 - 065	Yes (filtered and gasketed)	Yes	Yes (filtered and gasketed)
			096 - 180	Yes (filtered and gasketed)	None	Yes (filtered and gasketed)

Table is continued on the next page.

Table 330 -

Bulletin	System Voltage	NEMA Enclosure Type	Rating Code	Venting	Internal Circulating Fans	Door Mounted Exhaust Fans
2162R and 2163R (continued)	600	1, 1G	1P7 - 3P9	Yes	None	None
			6P1 - 144	Yes	None	Yes
		12	1P7 - 027	None	Yes	None
			032 (without reactor)	None	Yes	None
			032 (with reactor)	Yes (filtered and gasketed)	Yes	Yes (filtered and gasketed)
			041 - 144	Yes (filtered and gasketed)	None	Yes (filtered and gasketed)
2162U and 2163U 2162V and 2163V	480	1, 1G	2P1 - 5P0	None	None	None
			8P0 - 014	Yes	None	Yes
			022 - 065			
			077 - 248			
		12	2P1 - 022	None	Yes	None
			027 - 186	Yes (filtered and gasketed)	Yes	Yes (filtered and gasketed)
			248	Not Available		

(1) If -14RLX or -14RXL is specified for the 3.9 A at 600V or 5.0 A at 480V unit, the unit door will be supplied with input and exhaust venting.

Fans and Ventilation

Table 331 - Fans and Ventilation in Bulletins 2162T and 2163T

Bulletin	System Voltage	NEMA Enclosure Type	Current Rating (Amperes)	Venting	Internal Circulating Fan(s)	Door Mounted Exhaust Fan(s)
Bulletins 2162T and 2163T	380…415	1, 1G	1.4…24	Yes	None	Yes
		12	1.4…2.3 (1)	None	None (1)	None
			4.0…24	None	Yes	None
	480	1, 1G	1.4…24	Yes	None	Yes
		12	1.4…2.3 (1)	None	None (1)	None
			4.0…24	None	Yes	None
	600	1, 1G	1.7…19	Yes	None	Yes
		12	1.7 (2)	None	None (2)	None
			3.0…19	None	Yes	None

(1) When line or load reactors are specified in 2.3 A drive unit, an internal circulating fan is added.
(2) When line or load reactors are specified in 1.7 A drive unit, an internal circulating fan is added.

Table 332 - Fans and Ventilation in Bulletins 2162W, 2162X, 2163W, and 2163X

Bulletin	System Voltage	NEMA Enclosure Type	Current Rating (Amperes)	Venting	Internal Circulating Fans	Door Mounted Exhaust Fans
Bulletins 2162W and 2163W	480	1, 1G	1.4…30	Yes	None	Yes
		12	1.4…2.3	None	None(1)	None
			4.0…17	None	Yes	None
			24…30	Yes	Yes	Yes
	600	1, 1G	0.9…22	Yes	None	Yes
		12	0.9...1.7	None	None(1)	None
			3.0…12	None	Yes	None
			19…22	Yes	Yes	Yes
Bulletins 2162X and 2163X	480	1, 1G	1.4…24	Yes	None	Yes
		12	1.4…2.3	None	None(1)	None
			4.0…17	None	Yes	None
			24	Yes	Yes	Yes
	600	1, 1G	0.9…19	Yes	None	Yes
		12	0.9...1.7	None	None(1)	None
			3.0…12	None	Yes	None
			19	Yes	Yes	Yes

(1) When line or load reactors are specified, an internal circulating fan is added.

Control Circuit Transformer Rating Chart for Bulletins 2182E, 2182L, 2183E and 2183L

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Rack Size	Space Factor	Power Supply Type			
		None, 12P4S1, 12P4S2, 12P4R2 or 12PA72	12P2	12P7	12P4R3 or 12P4R4
(1) 4-slot	1.5	250VA	—	—	—
	2.0	250VA	—	—	—
	3.0	250VA	250VA	—	—
(1) 7-slot	2.0	250VA	—	—	—
(1) 8-slot	2.5	250VA	—	—	—
	3.0	250VA	250VA	—	—
(1) 8-slot	6.0, 25″ W	(1) 250VA	(1) 250VA	(1) 500VA	—
(2) 8-slot	6.0, 25″ W	(2) 250VA	(2) 250VA	(2) 500VA	—
(1) 16-slot	6.0, 35″ W	250VA	250VA	500VA	500VA
(2) 16-slot	6.0, 35″ W	(2) 250VA	(2) 250VA	(2) 500VA	(2) 500VA
(1) 16-slot	6.0, 40″ W	250VA	—	500VA	500VA
(2) 16-slot	6.0, 40″ W	500VA	—	1 kVA	1 kVA

Power System Configuration Application Information

CENTERLINE 2100 Motor Control Centers are suitable for use on 3-phase, 3-wire or 4-wire, Wye connected power systems, rated 600V or less, 50 or 60 Hz, that have a solidly grounded neutral. CENTERLINE 2100 Motor Control Centers can also be used on the following power system configurations, however, some units and options are available:

- 3-phase, 3-wire, Wye systems rated 600Y/347V or less, with impedance grounded neutral
- 3-phase, 3-wire, ungrounded Delta systems, rated 600V or less

For 3-phase, 3-wire, 'corner' grounded, Delta systems, 3-phase, 4-wire, center-tap-grounded, 'high-leg', Delta systems rated 240V, and any other power systems not listed above, the MCC is processed on the Engineered delivery program to help ensure proper product configuration.

TIP For more information regarding MCC selection criteria related to power system configurations, see the Power System Considerations for Selection of CENTERLINE 2100 Motor Control Centers, publication 2100-AT003.

Horizontal Neutral Bus and Neutral Bus Options

Neutral bus and options are only available for 3-phase, 4-wire WYE connected power systems with the neutral solidly grounded. Neutral bus options cannot be selected for any ungrounded system or for any system that is impedance grounded.

If a 4-wire system is selected, a determination needs to be made regarding neutral loads

No Neutral Loads or Neutral Loads Less Than 280 Amp

Option 88NPC is available for 2191M rated 300 A, 2192M rated 400 A or less, and 2193M with 400 A frame or less.

For 2191M rated 600 A or larger, 2192M rated 600 A or larger, and 2193M with 600 A frame or larger, horizontal neutral bus and incoming option -88HN or -88FN must be selected.

IMPORTANT If complete horizontal neutral is not required, horizontal neutral bus is allowed to be specified for only the section containing the Bulletin 2191M, 2192M, or 2193M main unit and up to three additional adjacent sections. However, the sections with the neutral bus need to be in their own shipping splits. If neutral loads are present, then access to the horizontal neutral bus for neutral load cables is required. At least one neutral connection plate in the horizontal wireway or one vertical neutral in a 9" vertical wireway is required.

Neutral Loads Greater Than 280 Amp

For 4-wire system with neutral loads *greater than 280 A*, horizontal neutral bus and incoming option -88HN or -88FN must be selected. In addition, at least one neutral connection plate in the horizontal wireway or one vertical neutral in a 9" vertical wireway *is required*.

IMPORTANT If any single neutral load is greater than 280 A, the MCC needs to be processed on the Engineered delivery program to provide an appropriate neutral connection point for the neutral load cable.

Any Units with Fusible Disconnect Switches

No restrictions for Wye connected systems or ungrounded Delta systems.

Any Units with Circuit Breaker Disconnects

No restrictions for Wye connected systems or ungrounded Delta systems.

Bulletin 2190 Units with Metering

Analog metering units are available for:

- 3-phase, 3-wire solidly grounded Wye
- 3-phase, 3-wire ungrounded, closed-Delta
- 3-phase, 3-wire impedance grounded Wye

Digital metering units are available for:

- 3-phase, 3-wire solidly grounded Wye
- 3-phase, 4-wire solidly grounded Wye

Metering for other systems is available on the Engineered delivery program.

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Important Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://www.rockwellautomation.com/literature/) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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